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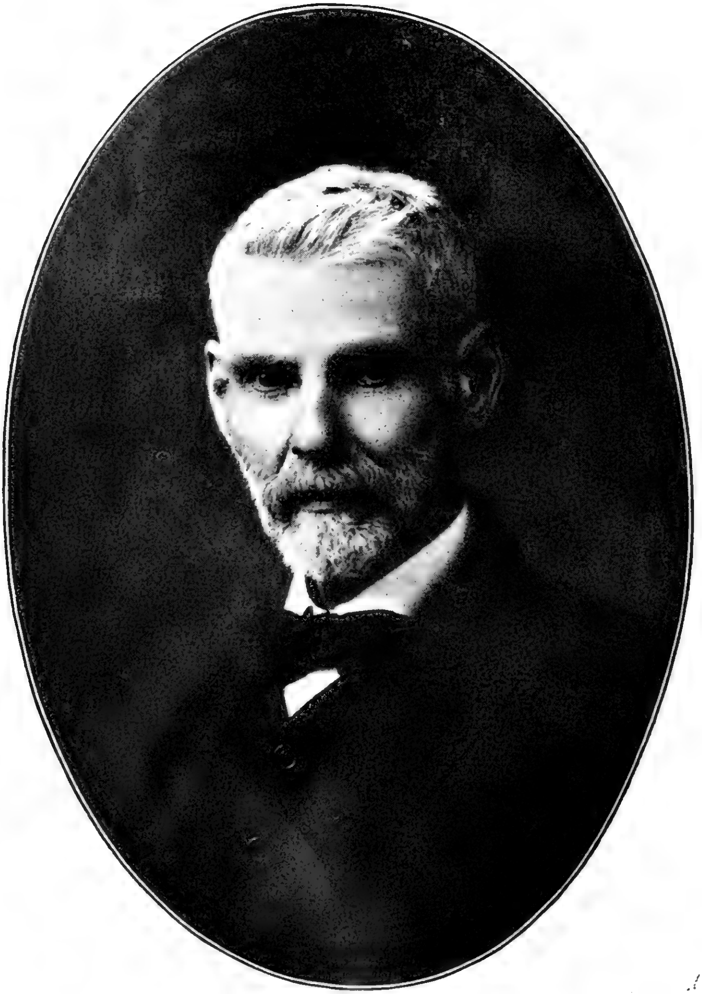


HERBERT HUNTINGTON SMITH

THE NAUTILUS.

Vol. XXXIII JULY, 1919 No. 1.

AN OLD COLLECTING GROUND REVISITED.

BY CHARLES W. JOHNSON.

While a resident of St. Augustine, Florida, from 1880–88, I made a careful study of the mollusca of the harbor and vicinity. The habits of the various species and the factors governing their distribution, which in many cases was much restricted, especially appealed to me. With these facts in mind it was with great interest that I visited the old city after an absence of thirty-one years. Time and the ever-shifting sands have played sad havoc with many of my old collecting grounds, and I looked in vain for some of the rarer species.

The accompanying maps can give only a general idea of the changes that have taken place.[1] The "Lagoon" of the eighties is gone and there are now two inlets with about the same depth of water on each bar according to the government chart, survey of 1910, although I was told that the southern channel has now much less water on the bar than the other. Marsh Island at the mouth of Hospital Creek is also gone, and the sand bar that was formerly only east of the island now extends to the fort. There is no trace of the site of the old Spanish lighthouse,

[1] Figure 1 shows the harbor and vicinity about 1883, before the St. Sebastian marsh was filled, also the approximate positions of the "Lagoon" and Marsh Island. The figures refer to the species mentioned in the text that were found at those particular places.

Figure 2 is based on the U. S. coast survey chart, No. 159, survey of 1910, and represents in a general way present conditions.

which was probably at the extreme end of the now exposed ledge of coquina and about 200 feet below the present high-

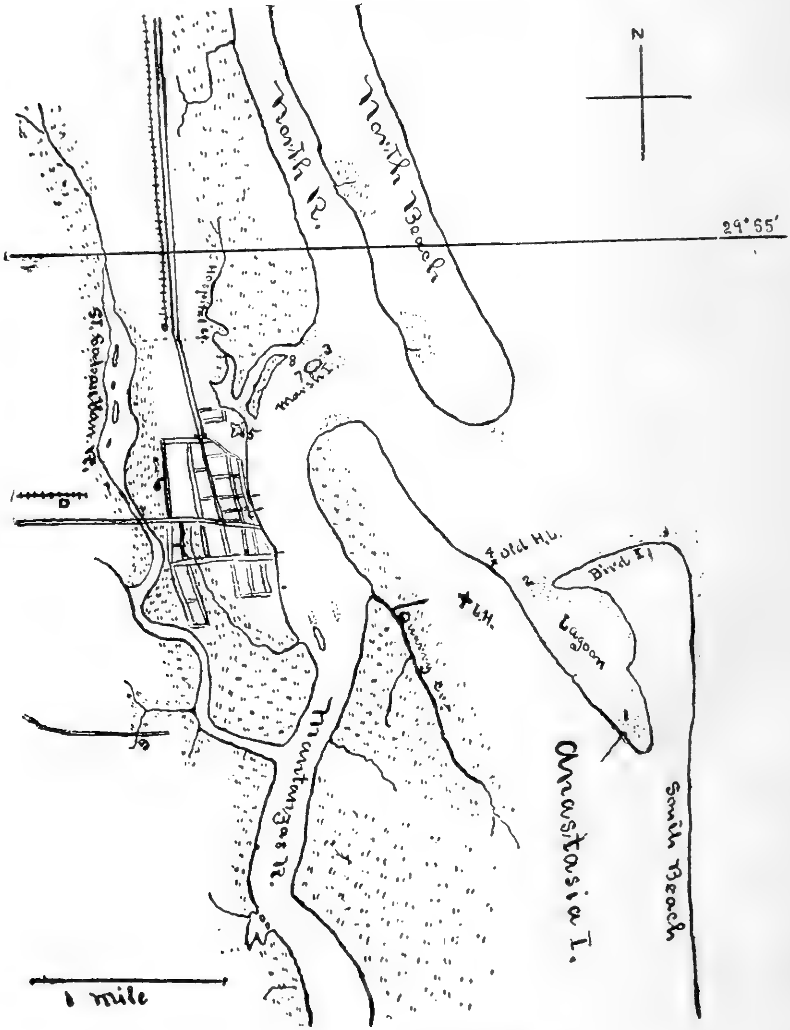


Fig. 1. St. Augustine, about 1883.

water mark. The government has endeavored to prevent the wearing away of this portion of Anastasia Island by construct-

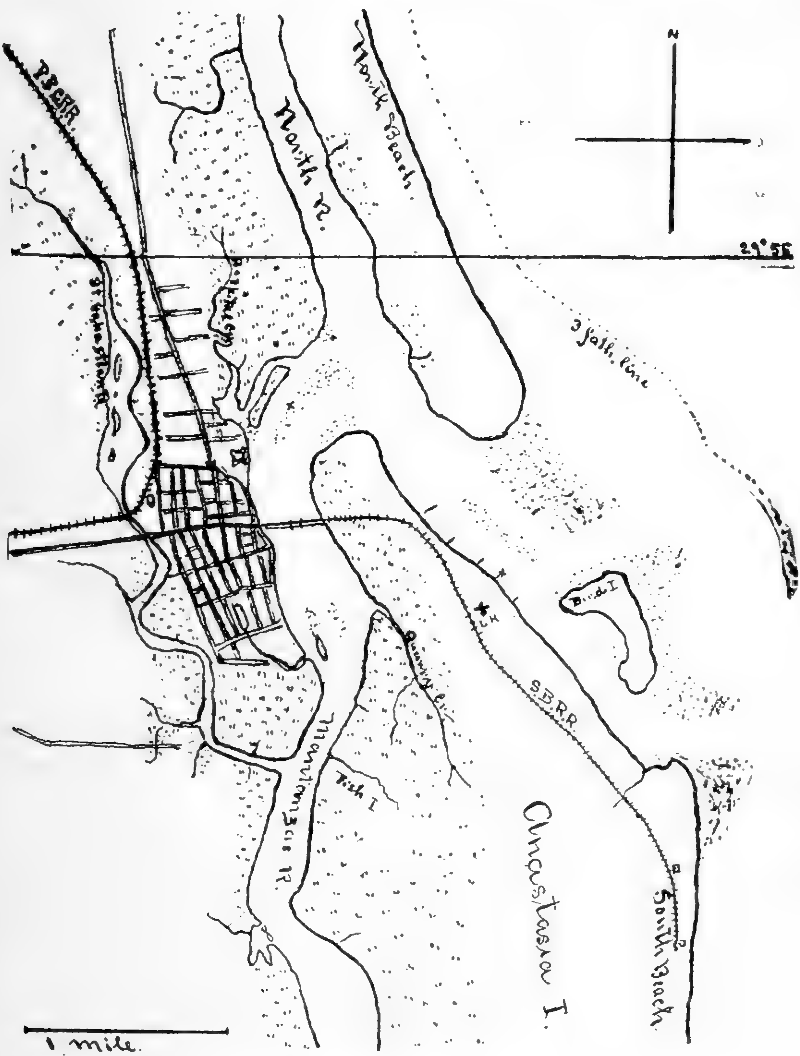


Fig. 2. St. Augustine at present.

ing four jetties, one below and three above the ledge referred to, but the erosion apparently still continues. The following notes are based chiefly on those species that were very limited in their distribution and which therefore may have become locally extirpated by the many changes affecting their environments. A list of about 200 species published by the writer in 1890[1] forms the basis of some of the following remarks.

Macrocallista nimbosa Sol. (1) This is the *Callista gigantea* Gmel. of my list. It was found only in the shoal water at the head of the "Lagoon," seeming to prefer the quiet water, as I never found a trace of it on the ocean beach. At most only six or eight specimens were found, and many of these were broken, probably by the large ray or "clam cracker" as the butterfly ray (*Pteroplatea maclura*) is called by the fishermen.

Donax obesa d'Orb. (2) This little chunky species was formerly common on the sand bars at the mouth of the "Lagoon," where there was a slight shifting of the sand at every tide. The larger species, *Donax variabilis* Say, was (and probably is) exceedingly abundant on the ocean beaches, especially the "South beach." I was quite amused at Daytona to hear the popular name of "coquina" applied to this shell, and one young man talking about "coquina bouillon." While this is entirely proper, as the Spanish word coquina means, broadly speaking, shell-fish, the name has become so generally used for the shell-rock (often made up largely of this species) that at first it sounded like pretty hard diet. I am sorry that opportunity did not permit my getting a large series of this species including the young, as I should have liked to have made some comparisons of the young of *D. variabilis* with that of the typical or more northern *D. fossor* Say. As I remember I could never satisfactorily separate the two forms at St. Augustine and omitted the latter from my list, although it is recorded from the entire coast of Florida and westward to Texas. Mazyck in his "Catalog of Mollusca of South Carolina," says of *D. fossor*, "very rare, Sullivan Island."

[1] An Annotated List of the Shells of St. Augustine, Florida, THE NAUTILUS, vol. iii, pp. 103, 114 and 137, vol. iv, pp. 4–6.

On one visit to the South beach I found it literally strewn with perfect specimens of *Divaricella quadrisulcata* d'Orb. (*Lucina dentata* of my list), but never again did I find them in such numbers. At another time quantities of an Arca referred to in my list as *Arca americana* Gray, were found. It is more elongated than those found in the harbor, with a thinner and lighter brown periostracum, and probably represents only a variety or ocean form of *A. campechiensis* Dillw. (Arca pexata Say).

Lucina philippiana Reeve (*Loripes edentula* of my list). Large single valves were frequently found and occasionally at the mouth of Hospital creek shells were found in the mud with both valves intact, but like the *Phacoides filosa* Conr. in Portland harbor, Maine, always dead. It may also be of interest to note that two specimens of *Solemya velum* Say, and a few single valves of *Mya arenaria* were found on the north beach, the most southern records for the species.

Panopea bitruncata Conr. (3) This large and variable shell which was referred to in my list under both *Glycimeris reflexa* Say, and *G. americana* Conr., was later the subject of a paper by the writer[1] in which the synonymy was straightened out, and a fine specimen found on the bar east of Marsh island was figured. Common in the pliocene of the Caloosahatchie, but recent examples are exceedingly rare. Living deep in the mud they are difficult to obtain, unless on rare occasions extensive harbor dredgings might bring some to the surface. They are also very apt to be destroyed by changes such as encroaching sand bars, sedimentary deposits, and harbor pollution.

The rocks that represented the ruins of the old Spanish lighthouse (the tower of which fell in June, 1880, while the keeper's house had fallen several years before) were a favorite place for *Thais floridana* Conr. (*Purpura haemostoma* var. *floridana* of my list). During my recent visit I failed to find a living specimen of this species either on the ledge or jetties, but the tides were not very low and it may be that they could have been found at a lower tide. On all of the rocks including the

[1] The Nautilus, vol. 18, pp. 73–75, pl. 4, 1904.

jetties were great numbers of *Siphonaria naufragum* Stearns (*S. lineolata* d'Orb.). One thing that seemed to impress me more than when I lived there, was the great abundance of oysters on all the rocks, even around the water battery of the fort and also on the piling. In speaking to an old friend regarding the matter, he said he thought that around the fort it was due to cleaning off the rocks a few years ago, thus presenting a clean surface for the young to cling to. This array of bristling oysters around the water battery of the fort deterred me from a hunt for *Nerita peloronta* and *N. versicolor* (5), three living specimens of which I found there together with *Litorina angulifera*, being the most northern record for the three species.

Cerithidea scalariformis Say (6). The only place that I ever found this species at St. Augustine was in the more sandy portion of the marsh west of the city between King street and Orange street, not far from where the Y. M. C. A. building now stands. The filling-in of the marsh has probably locally extirpated this species. Another related species *Cerithium floridanum* Mörch (7), *C. atratum* of my list, was also restricted to a small area, an old oyster bed at the west end of Marsh island. This is now a sand bar and the species may now be entirely absent in the harbor. At the latter place I also found my only living example of *Murex fulvescens* Sowb. (*M. spinicostata* Val.).

At the mouth of Hospital creek was a large patch of the grass-like Gorgonia—*Leptogorgia virgulata*. On this lived the little *Simnia uniplicata* Sowb. 8 (*Ovula uniplicata*), as the Gorgonia varied in color so did the shells of the *Simnia*, agreeing in color with the bunch of Gorgonia on which they were found—either white, light-yellow, orange or pink. On one occasion while hunting for *Simnia* a conspicuous object attracted my attention, its flesh-colored mantle with irregular blackish markings was very striking, and as it contracted I found I had a *Cyphoma gibbosa* Linn. (*Ovula gibbosa*), common to the West Indies. For some time I wondered why the animal of this shell should be so very conspicuous; then the thought occurred to me that in more southern waters probably most of them live on the "sea-fans" (*Rhipidogorgia flabellum*) and with their

reticulated structure as a background the animals would be scarcely distinguishable, like the Sargassum fish (*Pterophryne histrio*) in the gulf-weed (Sargassum).

Cyrena carolinensis Bosc. (9). In making a bridge across a small branch of the St. Sebastian River I first discovered this species. It was a large and interesting variety in which the umbones were unusually high, many of the specimens closely resembling in size and form the figure of *C. olivacea* Carp. from Mexico, as given by Prime (Monograph American Corbiculidae, p. 17, fig. 12, 1865). Although the tide flowed freely up the little creek, there was at low tide a small stream of fresh water even at the driest time. At the junction of this little stream and the high ground there was a small colony of *Neritina lineolata* Lam. (*N. reclivata* Say). I looked in vain for this species during my recent visit, nor did I find *Cyrena* near the little bridge, but it may still exist in other parts of the stream which time did not permit me to examine thoroughly. At the mouth of Pellican creek near the Matanzas Inlet was a colony of *Neritina virginea* Linn. They were the olive-green or more brackish water type and probably represent the most northern limit of this species on the Atlantic coast. About seven miles south of Matanzas Inlet was a large cypress swamp in what was known as "Bike's Hammock," here was found *Ampullaria depressa* var. *hopetonensis* Lea, which seems quite distinct from those of the St. Johns River drainage. There were also fine specimens of *Ancylus peninsulae* Pils. & Johns.—erroneously referred to *A. filosus* in my list. The east coast canal has drained much of this section now called Bikes Prairie on the coast survey chart. In many places I saw truck arms as I passed through the canal on my way north from Daytona.

These notes suffice to show some of the changes that can take place in a limited area in a comparatively short time, and the probable effect of such changes on certain species. It is not at all peculiar to St. Augustine, for similar changes are going on at many other places along the coast and in the vicinity of our cities. The importance of a careful study of a local fauna cannot be too strongly urged. The destruction of the forests, the

draining and filling of swamps and marshes, the construction of dams, etc., all tend toward lessening the fauna and flora of a given area.

NEW LAND SHELLS FROM ALABAMA AND TENNESSEE.

BY GEO. H. CLAPP.

POLITA CUMBERLANDIANA, n. sp.

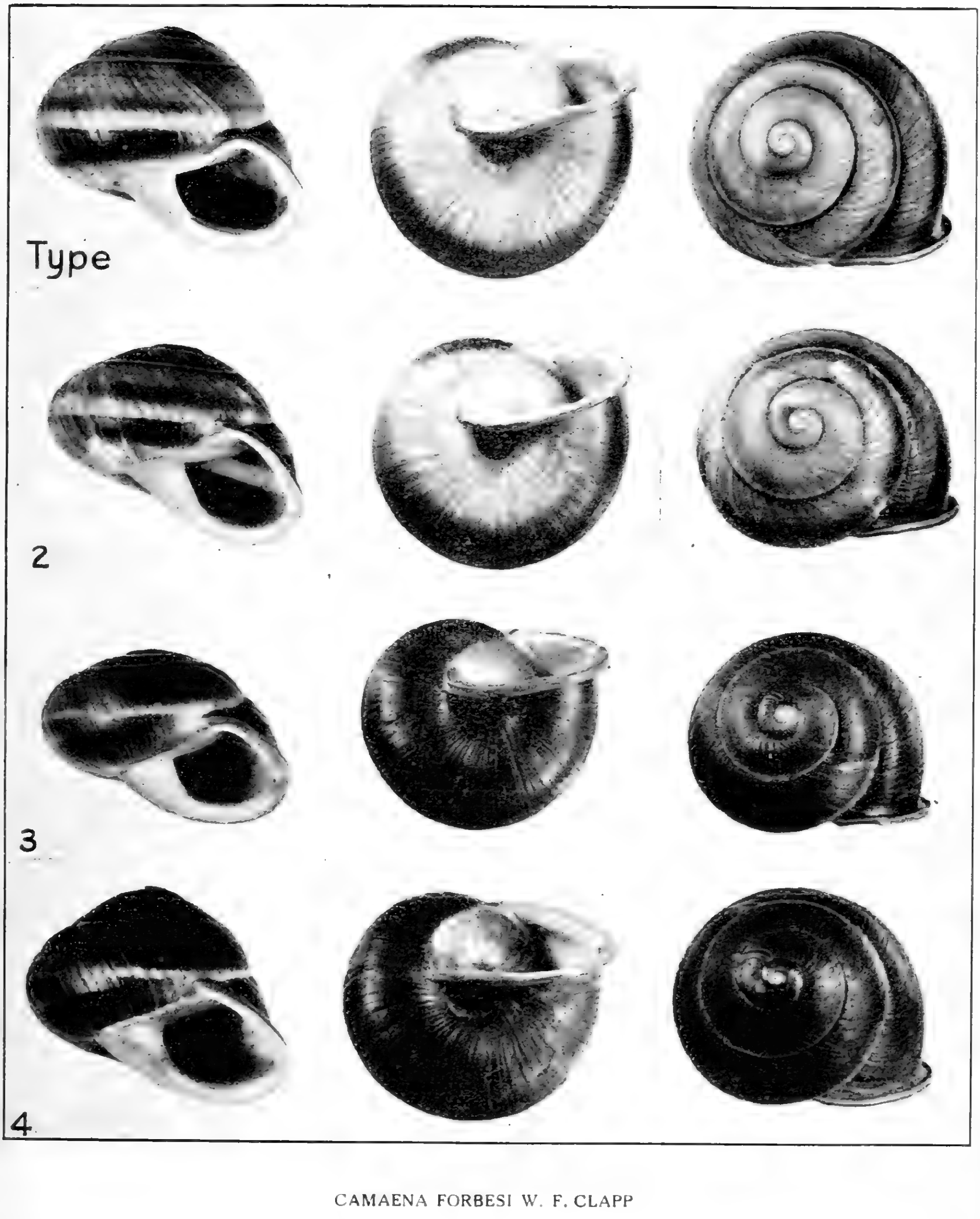
Shell widely umbilicated, flattened, very slightly convex above and below, glossy, thin and translucent, light horn color, regularly but lightly sculptured across the whorls by curved, closely set radiating impressed lines parallel with the lines of growth which are very faint; spire flattened; stature shallow; whorls about 4, rapidly increasing, the last decending at the aperture which is elongate-oval flattened above, lip very slightly reflected at the columellar insertion; umbilicus wide, displaying all the whorls and contained about 4 times in the diameter of the shell.

Greater diameter 3, lesser 2.5, altitude 1.25 mm.

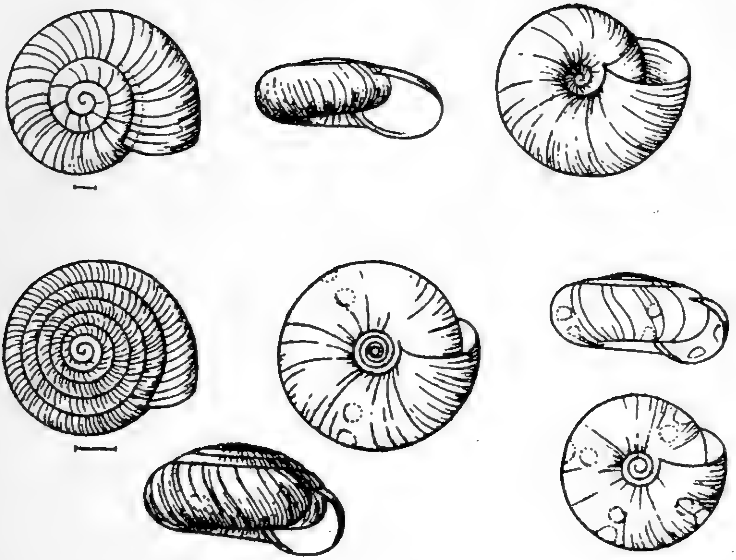
Collected by Herbert H. Smith on the Cumberland Plateau near Stevenson, Jackson Co., Alabama, also near Anderson, and near Sherwood, Franklin Co., Tennessee.

Types No. 9157 of my collection. Paratypes in the collections of the Academy of Nat. Sci., Philadelphia and Bryant Walker, Detroit, Mich.

At first glance this species may be taken for immature *V. radiatula* as the general shape and the sculpture of impressed radiating lines are the same, but it is uniformly small with the same number of whorls, the sculpture is weaker and the shell more flattened. Under high magnification there is merely the faintest trace of impressed spiral sculpture. It is much smaller than *Polita rhoadsi.*



CAMAENA FORBESI W. F. CLAPP



Polita cumberlandiana: upper three figures.

Vitrea pilsbryana: lower five figures, two at the right being immature shells, to show teeth of the neanic stage.

VITREA (PARAVITREA) PILSBRYANA, n. sp.

Shell widely umbilicate, elevated, convex above, flattened below, thin, translucent, highly polished when immature but becoming more opaque and yellowish in adults, light horn color, sculptured with unequally spaced radial grooves stopping at the periphery which is rather high; suture well impressed; whorls about 8 very closely coiled and slowly increasing, the last flattened above and below; lip simple very slightly reflected where it joins the columella, ends united by a thin callus; umbilicus wide, contained a little more than 3 times in the diameter of the shell, and showing all of the apex.

There are 3 or 4 pairs of large, tubercular, sometimes slightly oval teeth, visible thru the base of the shell at all stages of growth and in immature shells the upper teeth are visible from above. The upper teeth, which are slightly below the periphery, are the larger, more elevated and round at the top. The lower teeth are about centrally located on the base and are flattened

on top. When four pairs of teeth are present they are equally spaced at intervals of 90° and this appears to be the normal arrangement as only a few shells show three pairs which are spaced from 100° to 120°. The single fully adult shell (figured) appears to have but 2 pairs of teeth, but the shell is a dead one and quite opaque. Two young shells, 1.5 mm diameter with 3.5 whorls and 2.5 mm. diameter, with 4.5 whorls, each have 3 pairs of teeth.

Greater diameter 5, lesser 4.5, altitude 2 mm.

Collected by Herbert H. Smith in a "Cove" on the Cumberland Plateau, 3 miles north of Anderson, Franklin Co., Tenn.

Types No. 9159 of my collection. Paratypes in the collections of the Academy of Nat. Sci., Philadelphia, and Bryant Walker, Detroit, Mich.

This species belongs to the same group as *V. capsella lacteodens* and *V. andrewsæ*. It differs from both by the smaller size and *wider umbilicus* and from *andrewsœ* by the tubercular teeth arranged in pairs.

I name this species after Dr. H. A. Pilsbry whose "Revision of Paravitrea", Proc. Acad. Nat. Sci., 1903, pp. 204–212, Pls. X, XI, has done much to clear up this most interesting group.

A NEW FORM OF AMPULLARIA.

BY WILLIAM HEALEY DALL.

AMPULLARIA (FELIPPONEA) NERITINIFORMIS n. sp.

Shell solid, whitish or lurid purple under an olivaceous rather strong periostracum, frequently banded with four or five purple-black broad spiral bands which are most conspicuous on the white inside of the outer lip, the white interspaces being subequal; these bands however show but little on the exterior except at resting stages, in the specimens examined; the form of the shell viewed from behind, strongly recalls that of *Neritina reclivata* or *meleagris* though with a rounded base; from in front it looks like a short spired heavy *Campeloma*. The nucleus is small and

blunt, always more or less eroded; there are about four whorls in the adult with indications of about five resting stages; the surface is smooth except for inconspicuous lines of growth; the young are somewhat naticoid, with a small umbilicus, but this shape rapidly changes; the whorls enlarge rapidly, being as it were appressed toward the suture which is distinct but not channeled, while the umbilicus becomes relatively larger and more or less funicular; the aperture is egg-ovate, entire, the posterior commissure solidly filled with callus, the outer lip internally thickened, patulous not reflected; the inner thickened, continuous over the body; height of shell 33; of last whorl 31; of aperture 23; maximum diameter (in front of the middle of the whorl) 26 mm. U. S. Nat. Mus. Cat. No. 332780.

Habitat. Rio Uruguay, Department of Paysandu.

The operculum is horny, concentric, with the nucleus at the inner third; the radula is typically Ampullarioid and might be quite accurately represented by Troschel's figure of the radula of *A. urceus*, in the "Gebiss der Schnecken."

The literature has been carefully searched, both on the lines of *Ampullaria* and *Campeloma*, but nothing of the sort has been discovered.

The subgenus is named in honor of Doctor Florentino Felippone, whose energy and interest in exploring the fauna of Uruguay are deserving of great praise.

The peculiar form of this species, and its funicular umbilicus, so different from that of any other in the genus, seem to authorize its separation.

A NEW SPECIES OF PHYSA FROM NEW YORK STATE.

BY FRANK C. BAKER.

PHYSA ONEIDA n. sp. Shell of medium size, ovate, slightly inflated; whorls about five, slowly increasing in diameter; spire short, broad, the whorls flattened; color yellowish-horn; surface smooth and shining, with rarely a trace of spiral striae, but the

lines of growth may form more or less marked raised lines in some specimens; sutures slightly impressed, bordered below by a wide white band; protoconch smooth, rounded, rich wine color; aperture long-ovate, twice the length of the spire; peristome bordered within by a thickened rib edged with dark brown; columella thickened, slightly twisted; parietal wall covered by a thin callus which is folded over into and completely closing the umbilical region.

Length, 11.0; width, 7.5; aperture length, 8.0: width, 3.5 mm. Type.

Length, 13; width, 8.5; aperture length, 10.5 mm. Paratype.

Length, 10.5; width, 7.2; aperture length, 7.5; width, 3.7 mm. Paratype.

Length, 15.0; width, 9.0; aperture length, 11.0; width, 5.0 mm. Paratype.

This Physa has been included under *warreniana* Lea by the writer for a number of years. It is a small edition of that species agreeing in outline with Lea's figure and description in all essential details except size (see Lea's Observations, xi, p. 120, pl. 24, fig. 81). Lea's species, however, differs not only in size but has strong spiral lines on the surface which are absent in *oneida*. The shell in the smaller species is also more swollen and less cylindrical, and the spire is more depressed than in *warreniana*. It resembles *ancillaria* and has been constantly associated by the writer with that species as a variety. The shell is not as broad as *ancillaria* and the whorls are not shouldered. It perhaps more nearly resembles Walker's *ancillaria crassa*, but differs constantly in being less solid, lacking the variceal bands, the body whorl is less swollen, the columella is not as heavy, the spire is higher, the outer lip is not as much arched, and the aperture is more elongate. The color of *crassa* is purplish-white with an opaque texture while *oneida* is yellowish-horn, polished, with a translucent texture. *Heterostropha* has a longer, more acute spire, a rounder aperture, somewhat shouldered whorls, and a more twisted columella. There is some variation in *oneida* in the height of the spire, immature specimens having a somewhat longer spire than mature

shells. The surface is usually destitute of spiral sculpture, only a few faint impressions being observable in rare specimens. One individual, however, had been injured when the body whorl was about half completed and the part of the shell succeeding the injured portion is very heavily impressed with spiral lines, while the rest of the shell is perfectly smooth.

This shell was first recorded from Tomahawk Lake, Wisconsin, as *Physa ancillaria warreniana.* The same form occurs in Lake Maxinkuckee, Indiana, on the shore of Lake Michigan at Chicago, and a somewhat similar form has been received from Georgian Bay, Canada. It is the most abundant mollusk in Oneida Lake where it occurs on a wave-beaten shore. It is probably widely distributed, and will be found in collections labeled *ancillaria* and *heterostropha.* Specimens that have survived a second year and are of large size compare favorably with *warreniana* but may at once be separated by the absence of spiral sculpture which is especially strong in shells of Lea's species from South Dakota and other western states.

The bibliography of the new species is as follows:

1902. *Physa heterostropha* Baker (non Say). Moll. Chicago Area, Part II, p. 308, pl. 34, fig. 2 (part). Lake Michigan.

1911. *Physa ancillaria warreniana* Baker (non Lea). Trans. Wis. Acad. Arts, Sci. and Letters, XVII, p. 234. Tomahawk Lake, Wis.

1916. *Physa ancillaria warreniana.* NAUTILUS, XXX, p. 8. Oneida Lake, N. Y.

1916. *Physa ancillaria warreniana.* Tech. Pub., N. Y. State Coll. For., Syracuse Univ., No. 4, p. 273, *et seq.*, Fig. 45, nos. 34, 35. Oneida Lake.

1918. *Physa warreniana.* NAUTILUS, XXXI, p. 89. Oneida Lake.

1918. *Physa warreniana.* Tech. Pub., N. Y. State Coll. Forestry, No. 9, p. 173, *et seq.* Oneida Lake.

MOLLUSCA FOUND IN THE VICINITY OF DUBOIS, ILLINOIS.

BY A. A. HINKLEY.

For the identification of many of the species the author is indebted to Dr. Bryant Walker, Dr. V. Sterki, Dr. H. A. Pilsbry, Mr. F. C. Baker and Dr. Geo. H. Clapp.

Polygyra appressa (Say). Lowland timber, a small form.

Polygyra pennsylvanica (Green). Upland timber, a small rough form.

Polygyra thyroides (Say). General distribution, variable in size, some small and thin.

Polygyra clausa (Say). Upland timber, depauperate, few found.

Polygyra hirsuta (Say). Lowland, a few found but once.

Polygyra monodon (Rack.) Upland timber, once found in numbers about old logs in a pasture from which the timber had been removed. This form has been known as *P. leaii* (Ward).

Strobilops labyrinthica (Say). On decaying logs and under leaves.

Strobilops affinis Pilsbry. Found with the last.

Pupoides marginatus (Say). R. R. embankment, scarce.

Gastrocopta armifera (Say). Common.

Gastrocopta contracta (Say). Common, also a variety for which Dr. Sterki has proposed the name *abrupta*.

Gastrocopta corticaria (Say). Found in numbers on standing trees.

Gastrocopta pentodon (Say). Scarce, found in small numbers in an outside entrance to the cellar of a deserted house.

Gastrocopta tappaniana (Adams). A common species.

Vertigo milium Gould. Scarce, under pieces of board and sticks.

Vertigo ovata Say. But one specimen found.

Circinaria concava (Say). Only one specimen.

Vitrea hammonis (Ström.). Scarce.

Vitrea wheatleyi (Bland). Rarely found.

Vitrea indentata (Say). Common, generally found in open situations.

Vitrea cryptomphala Clapp. With the above but not as plentiful.

Euconulus fulvus (Müll). Not found often.

Zonitoides arborea (Say). All situations, numerous.

Zonitoides limatula (Ward). Lowland timber, scarce.

Zonitoides minuscula (Binney). Not common.

Zonitoides milium (Morse). With the above, scarce.

Taxodonta significans (Bland). One dead specimen.

Agriolimax campestris (Say). During wet seasons they do more or less damage to the fruit in the strawberry fields. In the fall of 1916 they were innumerable in the orchard.

Philomycus carolinensis (Bosc.). Common.

Pyramidula solitaria (Say). Under leaves in timber; like many of the species found here these are of small size.

Pyramidula alternata (Say). A few found in one place.

Pyramidula perspectiva (Say). Common in the bottom lands.

Helicodiscus parallelus (Say). Rather scarce, a few have been found in cellars.

Punctum pygmaeum (Drap.). Generally distributed.

Sphyradium edentulum (Drap.) One specimen only, although careful search was made in the same place three times.

Succinea concordialis Gould. North of the R. R. bridge on the west side of the embankment, where they were found for three or four years; of late they have disappeared.

Succinea avara Say. Individuals are scattering but found in various situations; some difference in size.

Carychium exile H. C. Lea. Wet place below the reservoir, numerous under fallen leaves.

Pseudosuccinea columella (Say). Generally distributed in the creeks.

Galba caperata (Say). In pools of a small branch near Sheller lake.

Galba modicella (Say). Pools and mud of a dry branch, Hinkley farm.

Planorbis trivolvis Say. Beaucoup creek and Sheller lake.

Planorbis antrosus Conrad. Little Muddy and Beaucoup creeks and Sheller lake.

Planorbis parvus Say. Pond north of the R. R. bridge.

Planorbis dilatatus Gould. Generally distributed.

Gundlachia stimpsoniana (Smith). Doubtfully determined. Associated with *Ancylus fuscus*, in the reservoir; generally on the under side of fallen leaves from the surrounding timber, never on the leaves of the elm and hickory. Both species were plentiful in 1908 and 1909, but have since disappeared.

Ancylus rivularis Say. Little Muddy creek.

Ancylus tardus Say. Beaucoup creek.

Ancylus fuscus Adams. Reservoir and Little Muddy creek.

Ancylus kirklandi Walker. Little Muddy and Beaucoup creeks.

Physa heterostropha Say. Sheller lake. (This is a R. R. reservoir.)

Physa gyrina Say. All streams and other bodies of water.

Physa sayi Tappan. Reservoir, one specimen; it may be a freak of gyrina.

Physa hildrethiana Lea. Pond north of the R. R. bridge.

Physa elliptica Lea. Above the R. R. bridge.

Physa integra Haldeman. Pond on the Hinkley farm.

Physa oleacea Tryon. Pool near the R. R. bridge.

Physa crandalli Baker. Pond on the Hinkley farm.

Pleurocera neglectum (Anthony). Little Muddy between Du Bois and Sheller lake; quite different from *C. subulare*.

Amnicola cincinnatiensis Lea. Puncheon, Locust and Little Muddy creeks.

Pomatiopsis lapidaria Say. Low land of Little Muddy creek, scarce.

Viviparus contectoides Binney. Beaucoup creek, a small variety.

Campeloma subsolidum (Anthony). Little Muddy, Locust and Beaucoup creeks.

Quadrula latecostata (Lea). Little Muddy creek.

Lampsilis distans (Anthony). Little Muddy and Locust creeks.

Lampsilis subrostratus (Say). Little Muddy creek and Sheller lake.

Lampsilis texasensis (Lea). Little Muddy creek.

Lampsilis parvus (Barnes). Little Muddy, Beaucoup and Locust creeks.

Anodonta imbecilis Say. Creeks and ponds.

Anodonta grandis ovata Lea. Creeks and ponds, plentiful.

Anodonta grandis salmonia Lea. Beaucoup creek.

Uniomerus tetralasmus (Say). Little Muddy and Beaucoup creeks.

Sphaerium sulcatum (Prime). Little Muddy and Puncheon creeks.

Sphaerium striatinum (Lam.). Little Muddy and Locust creeks.

Sphaerium stamineum (Conrad). Little Muddy and Locust creeks.

Sphaerium solidulum (Prime). Little Muddy and Beaucoup creeks.

Sphaerium occidentale (Prime). Little Muddy creek.

Musculium transversum (Say). Little Muddy, Beaucoup and Locust creeks.

Musculium contractum (Prime). Little Muddy creek.

Musculium truncatum (Linsley). Little Muddy creek.

Musculium elevatum (Hald.). Little Muddy and Beaucoup creeks and pond on the Hinkley farm. Closed to *Musculium hodgsonii.*

Pisidium compressum Prime. Little Muddy creek, Sheller lake and pond north of the R. R. bridge.

Pisidium fallax Sterki. Little Muddy creek.

Pisidium fraudulentum Sterki. R. R. reservoir.

Pisidium illinoisensis Sterki. Reservoir and pond on the Hinkley farm.

Pisidium politum decorum Sterki. Pond north of the R. R. bridge.

Pisidium punctatum Sterki. Little Muddy and Puncheon creeks.

Pisidium punctatum inerme Sterki. Beaucoup creek.

Pisidium sargenti Sterki. Puncheon creek.

LAND SHELLS OF SOUTHERN FLORIDA.

BY E. G. VANATTA.

The following species of land shells were picked from leaf mould collected in Lee County, Florida, by Mr. Clarence B. Moore on Keys not mentioned in THE NAUTILUS, volume XXVI, page 16.

Weeks Place, Crawford's Key near Marco.

Polygyra cereolus carpenteriana Bld.
Gastrocopta p. hordeacella Pils.
Gastrocopta rupicola Say.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.

Addison's Key near Marco.

Polygyra c. carpenteriana Bld.
Gastrocopta p. hordeacella Pils.
Gastrocopta rupicola Say.
Polita dalliana 'Simps.' Pils.
Zonitoides minuscula Binn.

Demorey Key.

Truncatella bilabiata Pfr.
Polygyra c. carpenteriana Bld.
Thysanophora plagioptycha Shutt.
Pupoides modicus Gld.
Gastrocopta p. hordeacella Pils.
Gastrocopta rupicola Say.
Strobilops hubbardi Br.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.
Zonitoides singleyana Pils.

Josselyn Key, Pine Island Sound.

Truncatella c. succinea Ad.
Helicina orbiculata Say.
Thysanophora plagioptycha Shutt.
Thysanophora cæca Guppy.
Polygyra c. carpenteriana Bld.
Gastrocopta contracta Say.
Gastrocopta p. hordeacella Pils.
Gastrocopta rupicola Say.
Strobilops hubbardi Br.
Euglandina rosea parallela Binn.
Polita indentata Say.
Guppya gundlachi Pfr.
Zonitoides minuscula Binn.
Zonitoides singleyana Pils.

NEW LAND SNAILS COLLECTED BY THE FERRISS AND HINKLEY EXPEDITION OF 1919.

BY H. A. PILSBRY AND JAS. H. FERRISS.

Sonorella montana. Resembling *S. walkeri* in form. Umbilicus one-eighth to one-tenth the diameter. Embryonic whorls densely granulose with rather sparse protractive threads, the next whorl indistinctly granose, later whorls very smooth. Aperture large, the outer margin expanded, basal somewhat reflected. Anatomically it is distinguished by the extremely short and slender penis, smaller than in any other species examined. Montana Peak, near the Montana mine, not far from Oro Blanco, and Bear canyon, further southeast, Pajarito range.

Alt. 14, diam. 23.7, umbilicus 3 mm.; $4\frac{3}{4}$ whorls.

Alt. 16.3, diam. 25.5, umbilicus 2.6 mm.; 5 whorls.

Sonorella hinkleyi, n. sp. The shell is small, depressed, solid, umbilicus about one-sixth the diameter. Embryonic shell radially rugose with sparse, irregular divaricating threads, later whorls slightly striate. Peristome very little expanded. A dark band is normally present, but at Station 244 albinos were found in abundance. Alt. 8.5, diam. 16 mm.; $4\frac{1}{4}$ whorls. Cayetano Mountains. Anatomically characterized by the long penis and vagina, the latter with a weakly marked muscular dilation. Papilla spirally plicate.

Sonorella cayetanensis, n. sp. Shell thin, light, the band pale-bordered above and below, umbilicus contained about 8 times in the diameter. Embryonic sculpture about as in *S. hinkleyi*, the later whorls polished, faintly striate. Peristome thin, little expanded. Alt. 11.7, diam. 21 mm.; $4\frac{3}{4}$ whorls. A thinner, larger, more capacious shell than *S. hinkleyi*, resembling it considerably in soft anatomy. Highest peaks of the Cayetano Mountains.

Sonorella tumacacori, n. sp. Except by its larger size, the shell is similar to *S. hinkleyi*. The genitalia differ by the larger node on the vagina, the more tapering penis-papilla and the very short penial retractor muscle. Alt. 10.4, diam. 17.8 mm.; $4\frac{1}{2}$ whorls. Stations 209, 210, in a large gulch draining the northeastern side of Tumacacori Peak.

Sonorella patagonica, n. sp. The shell is rather capacious with umbilicus about one-seventh the diameter, polished, rather solid, the band rather wide, pale-bordered on both sides, sculpture and form about as in *S. papagorum* P. & F. The vagina is swollen at base; penis-papilla large, tapering, conspicuously wrinkled transversely; flagellum distinct. Alt. 13, diam. 22 mm.; nearly 5 whorls. It is often larger. Mt. Washington, Patagonia Mts.

Bulimulus nigromontanus, n. subsp. Differs from *B. nigromontanus* by the narrower umbilicus, and is therefore temporarily separated as a subspecies. Pina Blanca in the Pajarito Mountains.

Sonorella mustang, n. sp. The shell is rather openly umbilicate, dilute cinnamon-buff with a pale-bordered dark band, glossy, nearly smooth, the embryonic shell coarsely, irregularly wrinkled with some irregular protractive threads. Last whorl descending rather deeply. Peristome expanded, the edge of parietal callus usually distinct. Alt. 15.3, diam. 26.5 mm.; 5 whorls. Mustang Range. Albinos were taken at Station 284.

Sonorella montezuma, n. sp. The shell is small, narrowly umbilicate, cinnamon, fading to nearly white on the base and on both sides of the chestnut-brown band. Embryonic whorls without protractive threads. Peristome slightly expanded. Alt. 9.4, diam. 15 mm.; 4½ whorls. Montezuma Canyon, Huachuca Mts. It is smaller than any known Huachucan species except *S. g. parva*, which inhabits the opposite end of the range.

Sonorella elizabethae, n. sp. Shell dilute cinnamon-buff fading on the base and on both sides of the *narrow* chestnut-brown band. Embryonic whorl having numerous, irregular portractive threads; later whorls microscopically lineolate-granulose. Aperture small, the peristome slightly expanded. Alt. 10.7, diam. 19.2, umbilicus 3.2 mm. Canillo Hills.

Sonorella cotis, n. sp. Shell dilute cinnamon-buff fading on base and on both sides of the chestnut-brown band. Embryonic whorls with weak protractive threads. Last whorl rather deeply descending in front. Peristome somewhat expanded, edge of the parietal callus distinct. Alt. 12.3, diam. 20, um-

bilicus 3.3 mm.; 4½ whorls. Whetstone Range. Most specimens taken this year are larger than the type lot, collected by Ferriss and Daniels in 1914.

Sonorella insignis, n. sp. The shell is much depressed, rather solid, openly umbilicate. Band is broad with pale borders. Surface roughened by low wave-like ribs in the direction of growth-lines, and microscopic incised lines. Aperture small. Peristome very little expanded, blunt. Alt. 9.8, diam. 20.5 mm.; 4½ whorls. Whetstone Range. One of the finest Sonorellas collected in 1919, recalling *S. dalli* by its depressed form.

MOLLUSCA OF FORRESTER ISLAND, ALASKA.

Univalves (Continued from page 69).

BY GEORGE WILLETT.

Tornatina carinata Gld. *Tornatina culcitella* Gld. *Cylichna alba* Brown. These three species were taken occasionally in the dredge, the latter being the most uncommon.

Dentalium pretiosum Nutt. Very plentiful in 10–40 fathoms.

Dentalium dalli Pils. A few young specimens secured in 50 fathoms.

Limacina pacifica Dall. Appeared swimming in the water in great numbers at times during calm weather. Extensively eaten by several species of fish.

Siphonaria thersites Cpr. Abundant in some localities, mostly in short moss growing on the rocks considerably above low tide line.

Crassispira perversa Garb. Dredged occasionally in 40–50 fathoms.

Crassispira rotula Dall. More plentiful than the last in about same depth.

Crassispira (*Suavodrillia*) sp.? A specimen dredged is now in National Museum. Stated by Dr. Dall to be undescribed.

Mangilia oldroydi Arnold. *Mangilia eriopis* Dall. *Mangilia crebricostata* Cpr. A very few specimens of each of these three species were taken in the dredge.

Bela tabulata Cpr. *Bela fidicula* Gld. *Bela impressa* Beck. *Bela pyramidalis* Strom. The two former fairly common, the two latter rare, all being taken in dredge.

Taranis strongi Arnold. Fairly common in 45–70 fathoms. Dr. Dall informs me that my Forrester Island specimens are the first living ones known to science, the species having been described from fossils taken in California.

Cancellaria modesta Cpr. A few dredged in 40–50 fathoms. Taken in inside channels, between Dall and Prince of Wales islands, in less than 15 fathoms.

Cancellaria couthouyi Jay. Three dead specimens dredged in about 50 fathoms.

Olivella pedroana Conr. Very abundant 15–40 fathoms. Apparently much larger than along the California coast; many specimens being well over 20 mm. in length and correspondingly broad.

Volutella pyriformis Cpr. Dredged occasionally; taken at Waterfall, Prince of Wales Island, under rocks near low tide line.

Mitromorpha gracilior Hemp. A few taken in dredge.

Alectrion mendicus Gld. Common 15–25 fathoms.

Buccinum cyaneum Brug. Common under rocks in many localities well above low tide mark. Occasional on rock walls.

Buccinum plectrum Stimp. Dead shells dredged occasionally in 40–60 fathoms. Not taken alive.

Buccinum erronis Dall. Very few dead specimens taken in 50 fathoms.

Chrysodomus phoeniceus Dall. One dead shell taken in 40 fathoms.

Chrysodomus liratus Mart. One dead young shell dredged. Rather plentiful in some localities in inside waters.

Chrysodomus rectirostris Cpr. Fairly common 40–70 fathoms.

Beringius crebricostatus undatus Dall. A dead young specimen taken in 50 fathoms. Possibly brought to the locality by currents.

Columbella tuberosa Cpr. *Columbella gouldi* Cpr. Former rather common 10–30 fathoms, and latter common in about 50 fathoms.

Columbella californiana Gask. One living specimen taken from root of kelp washed ashore in storm. Common under rocks at Waterfall.

Amphissa corrugata Rve. Common on rocks near low tide line.

Amphissa versicolor reticulata Dall. Abundant 15–20 fathoms.

Purpura foliata Mart. Rather common on rocks near low tide line. Most specimens on Forrester Island are much worn by heavy seas.

Boreotrophon stuarti Smith. *Boreotrophon tenuisculptus.* Cpr. Both of these forms dredged occasionally in various depths, the latter the most plentiful.

Boreotrophon pacificus Dall. Occasional on rocks near low tide line, much more abundant at waterfall.

Ocinebra interfossa Cpr. *Ocinebra lurida aspera* Baird. Fairly common on rocks near low tide line.

Thais emarginata projecta Dall. Locally on rocks well up toward high tide mark. Extremely variable in color, running from gray through brown, purple and green into yellow and red. Practically all seem to have drawn-out spire typical of this form.

Thais lima Mart. *Thais canaliculata* Ducl. Both these species are common on the rocks near low tide line. The former is the more gregarious and appears to favor the smoother rocks, while the latter is more scattered and is found mostly among short moss or in mussel beds. *T. lamellosa* Gmel., abundant in inside waters, apparently does not occur on Forrester Island.

Epitonium wroblemski Morch. *Epitonium pluricostatum* Dall. Both dredged at various depths, the former common, the latter rare.

Epitonium gronlandicum Perry. Only noted from fragment dredged.

Epitonium indianorum Cpr. *Epitonium columbianum* Dall. *Epitonium catalinae* Dall. The first dredged quite commonly in 25–60 fathoms. The latter two taken in about same depths but much less frequently.

Melanella micans borealis Bartsch. *Melanella macra* Bartsch. *Melanella tacomaensis* Bartsch. Four specimens of the first,

three of the second and one of the last species, represent all the Melanellas taken during the four seasons spent on the island. They were all dredged.

Turbonilla lordi E. A. Smith. Dredged occasionally in 25-50 fathoms.

Turbonilla canadensis Bartsch (Proc. U. S. N. M., Vol. 52, p. 640). The type and eight more specimens dredged in 25-50 fathoms.

Odostomia satura Cpr. *Odostomia cookeana* Bartsch. *Odostomia amtchitkana* Dall. *Odostomia vancouverensis* D. & B. *Odostomia stephensi* D. & B. *Odostomia columbiana* D. & B. Specimens of all of these forms were dredged, though in small numbers. Satura and Amtchitkana were seemingly the most common. At Waterfall I also secured specimens of *O. talpa* D. & B., *grippiana* Bartsch, and *willetti* Bartsch (Proc. U. S. N. M., Vol. 52, p. 666).

Priene oregonense Redf. Common from the low tide line to about 15 fathoms. Specimens in former locality are shorter and heavier than those found in deeper water.

Cerithiopsis stephensae Bartsch. A few dredged. Specimens of two other, apparently unnamed, species were also taken.

Bittium filosum Gld. *Bittium attenuatum* Cpr. Common, the former a little above low tide line and the latter in 10–20 fathoms.

Alvania dinora Bartsch (Proc. U. S. N. M., Vol. 52, p. 678). The type and four additional specimens dredged.

Alvania carpenteri Wein. Dredged occasionally.

Rissoina newcombei Dall. Dredged with last.

Trichotropis cancellata Conr. Rather common from low tide line to about 20 fathoms.

Trichotropis conica Moll. Two specimens dredged in 50 fathoms. Dr. Dall informs me that this is the first record for the Pacific coast.

Caecum crebricinctum Cpr. Dredged abundantly in 20–30 fathoms.

Veremetus squamigerus Cpr. Abundant on rocks near low tide line.

Tachyrhynchus lacteolus Cpr. Rather common 50–60 fathoms.

Littorina scutulata Gld. *Littorina stitchana* Phil. The former not very common, the latter abundant and varying greatly in color.

Lacuna divaricata Fabr. Fairly common on rocks.

Calyptraea mamillaris Brod. Common in 15–25 fathoms.

Crepidula nivea Gld. *Crepidula dorsata* Brod. Neither very common, but found occasionally from low tide line to 30 fathoms. The young of the former species is frequently found on the operculum of Priene.

Natica clausa B. & S. Rather common 15–40 fathoms.

Lunatia pallida B. & S. Not rare in 50–60 fathoms.

Velutina laevigata Linn. Fairly common in spongy growth on rocks near low tide line.

Velutina cryptospira Midd. Found common only in one locality. A short distance off shore was a large rock with a crevice ten to fifteen ft. wide worn right through the center from one side to the other. The water in this crevice was deep and the walls nearly perpendicular. On these walls at about the extreme low tide mark were great numbers of Ascidians and in these cryptospira was found in abundance. Though it was seldom smooth enough to allow me to enter this crevice with a boat at extreme low tide, I was able to do so on two or three occasions and obtained a fine series of living specimens. Some of these were very large, one measuring 31 by 23 millimeters. I am very much averse to referring this and the next species to the genus Velutina, as in life they are so entirely dissimilar to *laevigata*, the type of that genus. In *laevigata* the shell is mossy and is, so far as I have seen, entirely bare, while in these two species the shell is smooth and completely covered by the animal. On the other hand, both the animal and shell differ markedly from the genus Lamellaria.

Velutina rubra, new species. Description. In life similar to *V. cryptospira* but animal bright vermilion in color (this color soon disappears in alcohol). Shell smaller than that of *cryptospira*, rounder and with only a trace of spire. The type measures 13½ mm. in length by 9 mm. in breadth. This type together with four additional specimens were taken on Forrester Island by the writer. Three of these specimens were found at

extreme low tide mark and the other two were dredged in 40 fathoms.

Lamellaria stearnsi Dall. Two living specimens taken from among *Velutina cryptospira.*

Acmaea persona Esch. *Acmaea pelta* Esch. *Acmaea patina* Esch. Abundant on rocks, the first being found in somewhat more exposed positions than the other two.

Acmaea instabilis Gld. Three living specimens were taken on stems of holdfast kelp at extreme low water line. One dead specimen also found, as well as a few fragments.

Lepeta concentrica Midd. Dredged rarely.

Molleria quadrae Dall. Two specimens dredged.

Leptothyra carpenteri Pils. Rather common on rocks.

Calliostoma costatum Mart. *Calliostoma annulatum* Mart. *Calliostoma variegatum* Cpr. The first was common on rocks near low water line, the second rather common from low water mark down to 20 fathoms, and the third was much less plentiful and taken only with the dredge in from 15–40 fathoms.

Margarites pupillus Gld. *Margarites helicinus* Fabr. *Margarites succinctus* Cpr. *Margarites laevior* Jeff. All rather common about low water mark. Over 900 of the latter species were taken from the craw of a surf duck (*Oidemia perspicillata*).

Tegula pulligo Mart. Fairly common along extreme low tide line.

Solariella peramabilis Cpr. Abundant in from 15–50 fathoms. Some specimens taken were very large, measuring over twenty millimeters in height.

Solariella cidaris A. Ad. Fairly common in from 30–50 fathoms.

Solariella obscura Couth. Seven specimens dredged in about 50 fathoms.

Halistylus pupoides Dall. Three specimens dredged.

Haliotis kamtchatkana Dall. Common at low water mark.

Puncturella multistriata Dall. *Puncturella cucullata* Gld. *Puncturella galeata* Gld. *Puncturella cooperi* Cpr. All four of these species were dredged in from 15–50 fathoms. *Culcullata* was also taken rarely at extreme low tide mark. *Multistriata* and *galeata* were rather rare.

Subemarginula yatesi Dall. It was a very pleasant surprise to find this species—previously known, I believe, only from near Monterey, California—occurring at Forrester Island. It was, however, quite rare and, though particularly sought for, only nine specimens were taken. Five of these were living when found and the other four dead. One small live one was taken at extreme low water mark and all the others were dredged in from 15–30 fathoms. The largest, a dead one, measures 77 x 57 millimeters.

Fissuridea aspera Esch. Common along low water line.

Megatebennus bimaculatus Dall. Fairly common on rock walls near low water mark. Largest measuring 18x13 millimeters.

Leptochiton cancellatus Sby. Dredged in 20 fathoms.

Tonicella lineata Wood. Adults common along low tide line. Young rather common in 15–20 fathoms.

Tonicella ruber Linn. *Tonicella submarmorea* Midd. Dredged in from 15–30 fathoms; the latter the most plentiful.

Cyanoplax raymondi Pils. *Schizoplax brandti* Midd. Common locally along low tide line, generally in crevices in rocks.

Ischnochiton interstinctus Gld. *Ischnochiton mertensi* Midd. Abundant at from 10–20 fathoms.

Ischnochston willetti Berry. (Proc. Cal. Acad. Sci., vol. 7, p. 236). *Ischnochiton trifidus* Cpr. Taken at about the same depth as the last but in much smaller numbers, *willetti* being fairly common and *trifidus* rare. *I. radians* was taken at Waterfall but not on Forrester.

Ischnochiton retiporosus Cpr. Occasional in from 15–50 fathoms, occuring in deeper water than any other chiton found in the locality.

Trachydermon flectens Cpr. A few dredged in from 15–30 fathoms.

Mopalia ciliata Gld. *Mopalia ciliata wosnessenskii* Midd. Fairly common from a little above low water line to about 15 fathoms. I find considerable difficulty in differentiating these two forms but Dr. S. S. Berry tells me that, while most of my specimens are referable to *wosnessenskii*, there are a few that are nearer true *ciliata*.

Mopalia hindsi Rve. *Mopalia lignosa* Gld. Rather rare on

rocks between tides. Seven specimens of the former and two of the latter were taken. All the former were exceptional in size, one measuring 90 x 45 millimeters.

Mopalia imporcata Cpr. *Mopalia sinuata* Cpr. Dredged in from 15–25 fathoms, the former fairly common, the latter rare.

Placiphorella velata Cpr. Only two specimens, both taken at extreme low tide line.

Placiphorella rufa Berry (Proc. Cal. Acad. Sci., vol. 7, p. 241). The type and about fifteen additional specimens of this new form were dredged in from 15–25 fathoms.

Katherina tunicata Sby. *Cryptochiton stelleri* Midd. The former abundant, the latter common between tides. The *Katherina* is eaten to a considerable extent by the natives.

Land Molluscs.

Circinaria vancouverensis Lea. Common.

Ariolimax columbianus Gld. Abundant in following colors: white, black, gray, yellow and mottled.

Polygyra columbiana Lea. Abundant.

Pupa (sp. ?). A single Pupa was seen in a dead spruce cone. It was lost before being identified.

A NEW CAMAENA FROM THE PHILIPPINE ISLANDS.

BY WM. F. CLAPP.

Camaena forbesi n. sp. Plate I.

Shell solid, globose, depressed, opaque, with numerous faint oblique growth-wrinkles throughout, faintly spirally striate only on the post-nepionic whorls; the ultimate whorl naples yellow with a narrow russet line at the suture, a russet band between the suture and the periphery and a broader russet band just below the periphery, the bands becoming fainter on the earlier whorls; whorls five, consisting of two nepionic and three post-nepionic, slightly convex, the last slightly deflexed, suture very slightly impressed, last whorl rounded; peristome expanded, light purple drab, excepting where the light sutural zone terminates; the slightly thickened and reflexed edge walnut brown, margins connected by a very thin transparent

callus; columellar lip reflexed over one-third of the umbilicus; aperture oblique showing the bands within.

Four specimens give the following measurements:

	Altitude.	*Greater diam.*	*Lesser diam.*
1 type No. 35601	29.5 mm.	37.5 mm.	33. mm.
2	25.3	36.5	32.
3	24.0	35.	29.5
4	29.3	37.	31.5

Specimens of this new species were included in a large collection of Philippine shells given to the Museum of Comparative Zoology by W. Cameron Forbes, former governor of the Philippine Islands. They were collected by Mr. C. W. Weber at Bacuit, northern Palawan. I have named this shell for Governor Forbes as a slight acknowledgment of the great interest that he has taken, and the work that he has accomplished, in adding to our knowledge of the fauna of the Philippine Islands.

The specimen selected as the type, and described, is the most typical of the species. The specimen designated as number two in the table of measurements, is exactly similar to number one in color, and in the arrangements of the bands, differing only in being more depressed. Number three is very similar to number two in size and shape, but differs from numbers one and two in color, the lower band in this form having spread over the entire base, the upper band extending to the suture, leaving only at the periphery a narrow band of the typical naples yellow. Number four is similar to the type in size and form, and to number three in color. The variation is therefore expressed along two independent lines; first, a tendency for the shell to become more or less depressed; and secondly, for the bands to become broader and darker. Intermediates between all forms are in the series before me. The tendency in each individual specimen for the color to become darker as the shell increases in size, is constant in both the light and the dark forms.

The differences between this species and the description of what appears to be the most closely related species, *Camaena*

avus, as described by Pfeiffer (Proc. Zool. Soc. Lond., 1852, p. 83) are constant and may be tabulated as follows;

Camaena avus	*Camaena forbesi*
whorls 4	whorls 5
last whorl carinated	last whorl rounded
aperture scarcely oblique	aperture oblique as usual in Camaena
peristome thick	peristome slightly thickened
peristome white	peristome dark
margins joined by thick callus	margins joined by very thin transparent callus
altitude 18 mm.	altitude 29.5 mm.

The figures of *Camaena avus* in the Manual of Conchology (ser. 2, vol. 6, 1890, pl. 27, f. 15, 16, 17) were copied from Pfeiffer's original figures in the Conchylien Cabinet, t. 157, f. 12–14, and, besides showing a much more widely expanded and thickened peristome than occurs in *C. forbesi*, also show that *C. avus* is far more widely umbilicate.

Hidalgo (Obras Malacologicas, Estudios preliminares sobre la fauna malacologica de las Islas Filipinas, 1901, p. 196) states that the *C. avus* in the Quadras collection is similar to the *C. avus* of Mollendorff (Verz. Philipp. Landmollusk., 1898, p. 64) but differs from *C. avus* of Pfeiffer in size, in the bands, and in the umbilicus. It is possible that the *C. avus* of Quadras and Mollendorff is equal to *C. forbesi*. The figures of *C. avus* given by Hidalgo (loc. cit. pl. 133, fig. 4y5), however, do not represent *C. forbesi*.

Note.—In the figures (pl. I) reproduced from photographs by Mr. George Nelson, the reflected light on the glazed surface of the parietal wall greatly exaggerates the parietal callus, making it appear somewhat heavy and opaque, whereas in the specimen photographed it is very thin and transparent. The photographs have also failed to show sufficiently well the dark color of the lip.

NOTES.

MITRA AMANDA: A CORRECTION.[1]—In my little preliminary paper "New Marine Mollusks from the Philippine Islands," Proceedings of the Biological Society of Washington, volume 31, pp. 181–188, December 30, 1918, I published *Mitra amanda* new species from the Philippines, type Cat. No. 221815, U. S. N. M., collected by the author at Dumurug Point, Cataingan Bay, Masbate.

In monographing this group I note that the same combination was used by Lowell Reeve, Proceedings of the Zoological Society London, 1842, p. 59, and Conchologica Iconica, 1845, species number 318, type "from the islands of Burias and Negros, Philippines," now known as *Turricula amanda* Reeve.

It is therefore necessary to bestow a new designation on my shell, which may now be known as *Mitra signa*.—PAUL BARTSCH.

OPEAS PUMILUM PFR. IN PHILADELPHIA.—This snail has been living in the decayed boards of fences at the rear of the houses in the 1800 blocks of North 17th and N. Willington Streets for some time. I found the first specimen in 1917 and collected eight others April 30 and May 22, 1919. It may be of interest to record this West Indian species as it is new to Philadelphia. The colony is in the built-up part of the city, at the sides of a cemented alley and not near any hothouse. The animal excretes a white froth like soapsuds when it retracts into the shell. The eyes are very small and black. The body of the living specimens is pale yellow in color, with lighter tentacles. They are quite active in daylight after a rain.—E. G. VANATTA.

DR. HERMANN VON IHERING, formerly Director of the State Museum of São Paulo, Brazil, has accepted the position of Director of the State Museum of Sta. Catharina, to be organized by him. During the last few months he has been sent by the government on a scientific expedition to Argentina and Chile, charged with the study of the fishes and fisheries of these Re-

[1] Published by permission of the Secretary of the Smithsonian Institution.

publics. He hopes to be back and take up his new work in May. His address is: Director do Museu do Estate,
Flerianopolis (Estado de Sta. Catharina, Brazil).

NOTE ON THE NAME DUPLICARIA.—In 1908, in THE NAUTILUS, volume XXI, p. 124, I used the name *Duplicaria* for a subdivision of the old genus *Terebra*. I had omitted to notice that Rafinesque had used the same name for a species of *Chilina* in 1833, in his Atlantic Journal, p. 165. I propose, therefore, to substitute for the preoccupied name the new appellation *Diplomeriza*, with the same type, *Terebra duplicata* Lamarck.—W. H. DALL.

PUBLICATIONS RECEIVED.

TWO NEW LAND SHELLS OF THE EPIPHRAGMOPHORA TRASKII GROUP. By Paul Bartsch (Proc. U. S. Nat. Mus., vol. 54, pp. 523–524, pl. 83, 1918). The new subspecies are *E. cuyamacensis lowei* and *E. traskii isidroensis.*

NEW MARINE SHELLS FROM PANAMA. By Paul Bartsch (Proc. U. S. Nat. Mus., vol. 54, pp. 571–573, pl. 88, 1918). The new species are *Cylichnella zeteki, Odostomia zeteki, Heliacus panamensis, Discopsis panamensis* and *D. argentea.*

NEW MARINE MOLLUSKS FROM THE PHILIPPINE ISLANDS. By Paul Bartsch (Proc. Biol. Soc. Wash., vol. 31, pp. 181–188, 1918). Eight new species and two new subspecies are described.

THREE NEW PHILIPPINE ISLAND LAND SHELLS. By Paul Bartsch (Proc. Biol. Soc. Wash., vol. 31, pp. 189–202, 1918).

A REVIEW OF THE AUSTRALIAN REPRESENTATIVES OF THE GENUS ISCHNORADSIA. MONOGRAPH ON THE GENUS STENOCHITON WITH DESCRIPTIONS OF TWO NEW SPECIES. NOTES ON SOUTH AUSTRALIAN POLYPLACOPHORA, WITH ADDITIONS TO THE FAUNA, TOGETHER WITH A LIST OF AUSTRALIAN POLYPLACOPHORA, SHOWING THEIR DISTRIBUTION IN THE AUSTRALIAN STATES. By Edwin Ashby (Trans. Royal Soc. South Australia, vol. 42, pp. 62–87, pls. 13 and 14, 1918).

THE DOLABELLINAE. By F. M. MacFarland (Mem. Museum Comp. Zool., vol. 25, pp. 301–348, pls. 1–10, 1918). The systematic characters of the Opisthobranchiata, the bibliography of the described species of Dolabella and description of a new species *Dolabella agassizi*, is followed by a most extensive account of its internal anatomy, beautifully and clearly illustrated.

A NEW WEST INDIAN FOSSIL LAND SHELL. By Paul Bartsch (Proc. U. S. Nat. Mus., vol. 54, pp. 605–6, pl. 93). *Pleurodonte debooyi*, from kitchen-midden deposits on Salt River, St. Croix. This is the flat-whorled form long known from St. Croix as *P. caracolla.* The same form occurs living in Vieques and some places in Porto Rico, such as Arecibo and Utuado. At Guayama and in the Sierra de Luquillo the whorls are not quite so flat, and it is rather difficult to say where the line is to be drawn between this race and typical *P. caracolla.*—H. A. P.

ON THE GENERIC POSITION OF SONORELLA WOLCOTTIANA BARTSCH. By H. A. Pilsbry (Proc. Acad. Nat. Sci, Phila., p. 139, 1918). The soft part shows that it belong to genus *Micrarionta.*—C. W. J.

THE JOURNAL OF CONCHOLOGY, SEPT., 1918, VOL. 15, NO. 10.

The Pisidium Fauna of the Grand Junction Canal in Herts, and Buck. By A. W. Stelfox, pp. 298–304, pls. 7–9. One new species *P. tenuilineatum.*

Descriptions of a new Zebina and a new Liotina. By J. R. le B. Tomlin, p. 305, pl. 10. (*Z. lis* and *L. cycloma*, Japan.)

Description of three new species of Marginella from South Africa, with a note on M. sutoris Dunker. By J. R. le B. Tomlin, pp. 306, 307, pl. 10. (*M. aphanacme*, *M. ithychila*, and *M. atractus.*)

Neritina fluviatilis at Chester. By W. H. Davies, p. 307.

PROCEEDINGS OF THE MALACOLOGICAL SOCIETY OF LONDON, AUG., 1918, VOL. 13, PARTS 1 AND 2.

On the Radula of the genus Acanthina, G. Fischer. By the Rev. A. H. Cooke, pp. 6–11. A paper of special interest to the West Coast Conchologists. A new subgenus *Acanthicella* is proposed for *A. punctulata* Sowb., (=*lapilloides* Conr.); *A. unicar-*

inata Sowb. (=*engonata* Conr.) and *A. puncilirata* Stearns. The subgenus *Neorapana* is proposed for *Monoceros muricata* Brod. and *M. grandis* Sowb.

On the Taxonomic Position of Zemira H. and A. Adams. By the Rev. A. Cooke, pp. 12–14. The character of the radula would place it in the family Muricidae.

On the Occurrence in England of Hygromia odeca (Locard) [Helix limbata Drap., 1804, non Da Costa, 1778]. By A. S. Kennard and B. B. Woodward, pp. 14, 15.

On Siliquaria wilmana n. sp., from South Africa. By J. R. le B. Tomlin, p. 16.

Note on a white specimen of Ena montana (Drap.) By H. Overton, p. 17.

Description of two new species of land Mollusca. By G. K. Gude, pp. 17, 18 (*Khasiella fultoni*, Assam; *Plectotropis chondroderma* var. *subinflata*) Tonkin.

On Everettia klemmantanica n. sp. from Borneo. By G. K. Gude, p. 19.

Note on the Malacophagous Propensities of Helix nemoralis Linn. By Dr. W. T. Elliott, p. 20.

On the North American genus Oreohelix. By Junius Henderson, pp. 21–24.

On the dates oj issue of the parts of Forbes and Hanley's History of British Mollusca. By Alexander Reynell, pp. 25–26.

The Index Testaceologicus of W. Wood and S. P. Hanley. By A. Reynell, pp. 26–27.

Molluscan Nomenclatural Problems No. 1. By Tom Iredale, pp. 28–40. The author starts this interesting article with the following summary:

Tritonia, Cuvier discussed.

Euphurus, Rafinesque, 1815, should replace *Triopa*, Johnston, 1838.

Sphaerostoma, Macgillivray, 1843, must be used instead of *Tritonias* Cuvier, 1803, and of recent authorities not of Cuvier–Lamarck, 1798–1801.

Dotona, gen. nov. for *Melibæa fragilis* Forbes=Doto, Oken, 1815, not 1807.

Eubranchus, Forbes 1838, should be used for *Galvina* Alder and Hancock.

Laskeya, nom. nov. for *Eumeta*, Mörch, 1868, not Walker, 1855.

Collonista, gen. nov. for *Collonia picta*, Pease.

Talopena, gen. nov. for *Monilea incerta*, Iredale.

Korovina, gen. nov. for *Vanikoro wallacei*, Iredale.

Forskalena, gen. nov. for *Trochus fanulum*, Gmelin.

Enigmonia, gen. nov. for *Anomia rosea*, Gray=*Aenigma aenigmatica*, Ancti.

Amyclina, gen. nov. for *Buccinum corniculum*, Olivi.

Pyreneola, gen nov. for *Columbella abyssicola*, Brazier.

Caporbis, Bartsch, is a Vermetid nucleus.

Propebela, gen. nov. for *Murex turricula*, Mont.

Calceolata, nom. nov. for *Calceolina* A. Adams.

Mirothyca, not *Microtheca*.

Turrid names discussed:

Colicryptus, gen. nov. for *Buccinum fusiforme*, Broderip.

Siphonorbis marshalli, nom. nov. for *Fusus attenuatus*, Jeffreys.

Cominella and *Euthria* subdivided:

- *Afrocominella*, gen. nov. for *elongata*, Dunker.
- *Burnupena*, gen. nov. for *porcatum* Gmel. = *cincta*, Bolten.
- *Evarna*, H. & A. Adams, must be used for *linea*, Martyn.
- *Euthrena*, gen. nov. for *vittata*, Quoy & Gaimard.
- *Japeuthria*, gen. nov. for *ferrea*, Reeve.

Syntagma, nom. nov. for *Donovania*, Bucquoy, D., & Dollfuss.

Acostæa, Orbigny, will replace *Mulleria*, Ferussac, 1828.

Gistel's Molluscan Generic Names, 1848, enumerated.

Damoniella, gen. nov. for *Bulla cranchii*, Fleming.

Muricodrupa, gen. nov. for *Purpura fenestrata*, Blainville.

Teretianax, gen. nov. for *Scalenostoma suteri*, Oliver.

Presidential Address. By J. R. LeB. Tomlin. *A Systematic List of the Fossil Marginellidae*, pp. 41–56.

A Synopsis of the Classification of the Fresh Water Mollusca of North America north of Mexico, and a Catalogue of the more recently described Species, with notes. By Bryant Walker. Univ. of Michigan Mus. of Zoology, Misc. Pub. No. 6. Students of North American fresh-water mollusks of this generation have had as a basis the invaluable manuals

by W. G. Binney, Prime and Tryon, issued by the Smithsonian Institution, 1865–73, and the works of Lea on Unionidae, of about the same date. Some single groups have been elaborately treated since, the Uniones by Simpson, the Lymnaeidae by Baker; but most of the progress in the last fifty years has been recorded in a host of papers, by many authors and in many journals. To systematize this material and make it readily accessible, Dr. Walker has prepared this synopsis of the classification as understood today, giving definitions of the families, genera and minor groups, with figures of types or typical species of each, frequently also of anatomical structures important in classification.

The second paper is devoted to species published since the appearance of the monographic works alluded to above, together with those omitted, formerly misunderstood, or concerning which there has been diversity of opinion. The great utility of such a catalogue will be apparent.

Together, these papers give a most interesting epitome of the progress made by the present generation in the study of our fresh-water mollusks, so far as classification and description are concerned. Dr. Walker's long familiarity with the subject enables him to present it lucidly and completely.—H. A. P.

New Land Shells from the Philippine Islands. By Paul Bartsch (Proc. U. S. Nat. Mus., vol. 55, pp. 291–307, pl. 18–20, 1919). Six new species and subspecies of *Cochlostyla*, one new *Chlorea* and a new *Leptopoma* are described and figured.

Descriptions of New Species of Chitons from the Pacific Coast of America. By William H. Dall (Proc. U. S. Nat. Museum, vol. 55, pp. 499–516, 1919). Five new species of the genus *Lepidopleurus;* two new *Nuttallina*, fourteen new *Ischnochiton*, one new *Chaetopleura*, seven new *Callistochiton*, four new *Mopalia*, *M. grisea* being the type of a new subgenus *Semimopalia*, one new *Acanthochiton* and two *Tonicia*. None are figured.

The Unione Fauna of Alabama. By Bryant Walker (20th Rept. Mich. Acad. Sci., 1918). An interesting summary. The State has the largest Unione fauna of any area of similar size in the world. Three faunas are represented known as the Tennessee, Alabama and Atlantic faunas. Of the 533 species of Unionidae belonging to North America, more than 300 are found in Alabama.—C. W. J.

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ALONG THE MEXICAN BORDER, 1919.

BY JAMES H. FERRISS.

New Year's day a turkey dinner in Tuscon with Frank Cole. The next day Sonorellas in the Santa Catalina foothills; but it was not until the 13th, at the Tumacácori Mission, on the Santa Cruz river that the whole party answered roll call. A. A. Hinkley, our Mexican and Central American explorer, of DuBois, Ill.; Robert Camp, collecting everything, alive or dead, for the American Museum, of Brownsville, Texas; Miss Elizabeth Pilsbry, of Philadelphia, daughter of our NAUTILUS Editor, and Mrs. Ferriss answered. I called the roll. Miss Rell Gelder, of Detroit, Michigan, joined the party later.

This camp was in easy walking distance of the Tumacácori and San Cayetano ranges, and in an hour by auto we attacked the slides of the foothills south of the Santa Ritas. It was a rich location, also agriculturally and historically. Here came the Spanish priests from Mexico as early as 1601. The foundation of the Mission was laid in 1700 and the building still occupied in 1911. Here too was a mining city, Tubac, in the midst of rich fields of gold and silver. The priests were also miners, and later came a company equipped at Los Angeles, Texas, that prior to the civil war took out silver by the million dollars.

In fact the Aztecs were energetic miners way back, and the ruins of a large city in the Tumacácori mountains is supposed to mark the town site of one of those seven cities of Cibola. Says J. Donald Mitchell, an Arizonian historian: "On the sides

of the mountain lie the ruins of many dwellings and on top, carved from the solid rock, is the Aztec god standing guard over the silent city. Near by on a large flat rock are the basins, or cups, carved in the rock, that held the bleeding hearts of the unfortunate victims that were sacrificed to appease the wrath of this stone god. History tells us that often the victims were pretty little girls chosen from among the thousands who visited these Aztec cities every year during the great fiesta."

Aztec legends tell us 2050 burro loads of white silver and 905 of gold and silver were buried by those Indians a certain number of paces from a certain point, but the rare and noble *Sonorella walkeri aguacalientensis* P. & F. was again discovered by us in a small group of hills on Josephine Canyon between the Santa Ritas and the Cayetanos. Three new Sonorellas were dug up in the Tumacácoris, *S. tumacacori*, *S. hinkleyi fraterna* and *S. walkeri montana*; in the Cayetanos *S. hinkleyi* and *S. cayetanensis*. Miss Pilsbry put the Mission on canvas and sketching pad. Camp gathered many kinds of bats and lizards. Others have given a lifetime here at Tubac, digging and exploring, tormented by cat-claw, cacti and rough traveling, but have not found the Aztec gold or silver.

These many generations of miners have left but little timber on the hills. A few oaks on the mesas and peaks, and only in the heads of deep gulches is there anything like reforestation. In earlier days, with Arizona snail hunters it was at least a climb of 8,000 ft. for Sonorellas, and rock covering of three feet or no work. In the Cayetanos without regard to elevation they were found in the soil next to boulders and under spawls lying about the gravelly cliffs. Often a cliff or rock slide ten feet square would yield a cocoa-can full. Once we obtained two cans full, 452 by count, and all albinos except 24. Near the peak of the highest mountain at the southern end of the range, on the north-east side, is a gentle sloping cove of about forty acres of Sonorella rocks. But the sun was just going down as it was discovered and only a few Sonorellas were gathered.

The Pajarita Range is a wide expanse of rolling hills, a continuation of the Tumacácori, on both sides of the international line, timbered, well watered and sodded. The Governor

of the state of Sonora has built a barbed-wire fence along the line to keep the cattle thieves on their own side. Although not in the cattle business we did not cross over. It was a different country in character from anything seen in Arizona, and so pleasing we camped in these hills for three weeks.

We spread our blankets under the wide branches of the live oaks and visited the Phil Clark ranch. A couple of caged eagles were at the door and young Clark was found reading by lamp light with a fool quail perched on his shoulder. This is one of the rarest of the quail family, a good introduction. We talked birds and things till a late hour. Clark junior led us to the snail slides and the bat caves the following day, and ever after was a very helpful companion in our excursions. The first day out he heard something in an old mining tunnel he was exploring for bats, and a shot in the dark brought a wild pig. We ate about all but its head and feet. We camped again in Pina Blanca Canyon at the Moon U. S. Forest Station, and I went with Clark to the Bear Canyon, a scenic picnic resort, and found *Asplenium firmum*, a fern rare even in Florida, and again rediscovered *Agave parvifolia*, the smallest of the century plants. We picked up a new pin-cushion cactus large as a table bowl. Also a pair of whip snakes for Camp. We found *Sonorella walkeri montana* here and at the Tumacácori pass and it was also found by Hinkley at the Montana Mine, near Oro Blanco.

Among the smaller Sonorellas in the Pina Blanca Canyon and again across the mesa in the Tumacácori, the first *Bulimulus* for Arizona was noted living in a strange situation, for it is a snail of the grass and brush.

At old Calabasas at the mouth of Sanoita creek, emptying into the Santa Cruz, junction also of the two branches of the Southern Pacific Railway entering Mexico, we camped a few days to work that end and the best of the Cayetanos. Again we were in claw and thorn desert surroundings. At the Mission robins by the thousand, bluebirds, thrashers, cardinals and jays and Gamble's quail came after the hackberries, but the Calabasas camp was a little tame. However Camp secured rats, mice and gophers on the kangaroo plan, and our luck in snails was pleasing.

In the Eighties Calabasas was one of the wonders of that decade, according to the promoters' literature in New York. The Metropolis of the Far West was its name. Side-wheel steamers plied the Santa Cruz, whereas we had a hard time crossing that stream in the dry sand. The docks were piled high with cotton and tobacco bales in the pictures, hogsheads of sugar and pigs of metal. Picturesque Mexicans hustled cattle into the stock yards. The Indians just across the river were chasing buffalo, deer and elk. Lithographs also revealed hotels, boards of trade and banks, their corridors filled with excited investors in silk hats and sombreros. The hotel and another large building remain, but the land for miles around after being in the courts for many years is now in the possession of the heirs of a Spanish grant—the Bacca Float.

On the west side of Mount Washington, of the Patagonia range, *Sonorella patagonica* can be found in the boulder dikes and islands of the canyons and the dead were plentiful in the foot hills west of the Nogales-Duquesne highway. A hard half-day in the brush and briars of the Red Mountain, property of the Red Mountain Mining Co., north side, netted two Sonorellas.

Mt. Washington seemed to be above 8,000 feet high, and our camps about 5,000. There was much snow on both sides, east and west, and the pass was long and steep. Army-truck drivers camped with us for the night as the pass was too difficult for anything except the best of daylight. It took three trips to get our party over and then Hinkley with the empty auto and empty trailer on the fourth trip was hung up on the brow of the mountain in a snow storm all night. Merely for company I was in the party. With a good fire we were fairly warm and dry, and slept some.

At Duquesne *Sonorella parietalis* was found in the same colony with *patagonica*, sixty of them alive. A large collection of Pupas and other small ones were gathered and Mr. Hinkley is now sorting them out of the dirt. He also has the fresh-water collection. This mining property owned by the George Westinghouse heirs was the liveliest camp in our journey. Copper was being rolled out at war-time speed and the ore shipped to El Paso via a Mexican R. R. station, at the foot of the San

Jose peak, where *Sonorella mearnsi* dwelt at the time of the Boundary Survey.

Bound for the Huachucas to pick up better sets of former collections, we dropped down the Patagonia mesa through a thick grove of young oaks with cultivated ranches in the canyons. Then out upon a Kansas prairie landscape where the highway crosses the head of the Santa Cruz running south and the Barbacomari running north. Here are a number of prairies, without brush or thorns as beautiful to the eye as any state can produce. The Canillo Hills for thirty miles or more are covered with a thick growth of oak and juniper. At the high peak east of our road we found *Sonorella elizabethae* in abundance, and in the limestone hills west were small colonies of Holospira for three miles under spawls close to the stratified terraces, but a foot or so in height. Also in the rocky hillsides.

Across another beautiful prairie we were again in the Huachucas at the Manilla mine, at the northwestern end. Here we were comfortably housed at the property owned by some of my Joliet friends, and at the home of the typical *Holospira ferrissi* Pils. It seemed convenient to have lamps and a cook stove. Again we camped in Carr Canyon, near the home of our friend Biederman the entomologist and father of walnut grafting. Side trips were made to Garden, Brown, Miller and Ash Canyons.

Around the southeast point of the range we went into new territory, Montezuma and Copper Canyons, and again gathered *Ashmunella heterodonta* at Ida Canyon. These are rich canyons and so extensive they have not been thoroughly explored. One of the smallest of Sonorellas turned up in Montezuma Canyon, *Sonorella montezuma.* It was found abundant in lime, granite and porphyry. Again we had splendid quarters, a stove and lamp, on the State of Texas mining property. These mountain ridges run into Mexico, and ranchmen obtain permits from the Mexicans, when they desire to journey into Tombstone, Naco and Douglas with a vehicle.

From the Huachuca camps several raids were made on the Mustang and Whetstone ranges about twenty miles away. The first range, about 6,000 feet, has shells in every stone-pile, and the climbing is easy and clean. It is a model for collectors to

follow. In one colony of large Sonorellas about one in ten was an albino, beautifully modeled and with yellow lips. We worked here into a bank of clay and broken stone until we had a face to our mine high as our heads. The Sonorellas dwelt in the spaces between the clay and stone and at twenty feet in live Sonorellas were found. It was then dark and I had undermined a large Ocotillo that rolled me over and left a bump on my head for this summer. Again we had trouble in finding *Sonorella dalli* Bartsch, at Garden Canyon (Tanner's) in the Huachucas. Here we followed a wide crevice in the limestone filled with soil. At a depth of about two feet we followed crevices a couple of times and found over seventy alive. The sixty Sonorellas at Duquesne and as many red Sonorellas in Miller Canyon were found in like manner. In Brown Canyon at the foot of a high cliff of limestone dead shells were abundant. Accidentally a scale of the cliff was torn off, and here was the live *Sonorella granulatissima latior*, we were looking for, with Oreohelix and Ashmunellas.

About this time we admired our skill. After these many years, one of us said, we have become 100 per cent. shell collectors. On my first journey to Arizona I had raked over the leaves and turned logs and stones lying on the soil. I walked through the grand Tanner Canyon disdainfully past these rich Sonorella mines.

But to follow this mutual admiration convention, we did not find live Oreohelix in the Mustangs though dead shells covered the ground and crowded the rock slides. Here however the limestone cliffs did not scale. They were cracked apparently from one side to the middle, or the other side.

We made two trips to the Whetstones before finding a shell of any kind. We thought we knew whether a mountain had shells or not by merely looking at it. On the third trip a long slide facing east was discovered. This had a great abundance of the most delicate and artistically constructed Sonorella so far identified. All were dead except a few less than half grown. The colony had been destroyed by some insect that had evidently dissolved the lime with some of its juices, making a hole in the shell large enough to crawl in and eat 'em up. The

opening was usually oblong and about one or two millimeters long. Here the trail was so thorny and the gulches so deep we could walk only about a mile per hour in the mountain. Two days were given to the slide.

We had good success in the Tumacácori, Cayetano, Patagonia and other mountains on *all* sides of the peaks and had forgotten that in some ranges shells lived only on the north side. On the fourth trip to the Whetstone, while passing the north side of a small peak to get to the largest in the range, another Sonorella was found alive and plentiful. Also *Oreohelix huachucana* and a Holospira.

We feel certain there are a considerable number of undiscovered snails in the limestone, well watered and timbered (8,000 feet) peaks of the Whetstones, on the north side. Some of these we examined, on the south side.

The rains arrive in Arizona in July, which is the best growing month; but this year in the first week of May the Mariposa group of lilies covered the slopes. The west mesa of the Santa Ritas was a golden yellow, for the poppies were in bloom. Also the large white thistle poppy. The Ocotillo (Crown of Thorns) with a deep crimson spike, and cactus bloom, white, crimson and orange, warmed up the desert hills. The last night out blankets were spread in the dry bed of a stream in a pass of the Mustangs. It was really a beautiful place. Gravel makes a good bed, as desert beds run, and the banks were decorated with spreading walnuts and oaks. The junipers and cottonwoods were artistically rounded and all in full leafage. Three kinds of doves were talking, a cardinal, a thrasher and the vermillion fly-catcher were singing just at sundown, and the black and white scolding hummingbird in our tree, nervous in the face of distinguished company, had settled down in his thimble nest for the night.

The Mustangs are not large mountain, but they have pleasing profiles, domes and table tops, for background purposes, when the moon is up a little way and the evening star is in close conjunction. Arizona nights are a cut-glass, crystal affair. Not smoky and beclouded.

When the after-glow was just about right I led the partner

who has made life so pleasant these many years in housekeeping and business, over the shallow bank where only a few nicely terraced oaks were to be seen, and striking an attitude, front of stage, exclaimed "Look at that. That is perhaps the one best view, celestial, we will ever get."

In the morning Henry was halted at the windmill to be filled up. The owner of the pasture, we had learned to like; "he is white" we said, with his helper was doing his chores. He carried a double row of cartridges in his belt; a forty-five and a telescope lay upon a barrel-head, and a rifle rested against the derrick. The equipment was the best.

"Going a hunting?" I asked, innocent-like.

"Not this morning," he answered. "The fact is," he added, "it takes two of us to watch that fellow over in the other house. We have been shot at in this corral several times. Our fences have been cut and three horses and a cow shot this week. He wants me to buy him out and I don't want his ranch at the price he asks."

It is but a short distance from one thing to another all round the world. On the fifth of May we were again in Tuscon having collected at 134 stations.

NOTES ON THE SPECIES OF FASCIOLARIA OF THE SOUTHEASTERN UNITED STATES.

BY CHARLES W. JOHNSON.

The following notes of long standing are brought together for the purpose of pointing out some discrepancies that seem to have passed unnoticed. Another object is to supply a demand from some of our readers for something more pertaining to the marine mollusks.

Fasciolaria gigantea Kiener.

F. papillosa Sowerby, Tankerville Cat. App. p. 16, 1825; Reeve, Conch. Icon., (Fasciolaria) vol. 4, pl. 1, f. 1a, 1b, pl. 7, f. 1c, 1d, 1847.

F. gigantea Kiener Icon. Coq. Viv., (Fasciolaria) p. 5, pl. 10 and 11.

Tryon's Manual Conch., vol. III, p. 75, fig. 14–16, 1881.

F. crocata Philippi, Zeitschr. f. Malak. p. 25, 1848: Abbild. Besch. Conch. III, (Fasciolaria) Tab. I, f. 3, 1849.

F. reevei Jonas, in Philippi, Abbild. Besch. Conch. III, (Fasciolaria) Tab. III, f. 2, 1850.

Even this large shell is not free from a nomenclatorial tangle. *F. papillosa* Sowb., as pointed out by Tyron, seems to be the oldest name. I have not access to the Tankerville Catalogue, but if the young specimen as figured by Reeve (fig. 1a, b) and copied by Tryon (fig. 15) is the type, then this name seems somewhat doubtful. The spire and canal are both too long for a specimen of that size, in fact I cannot see any difference in figs. 1a and 1b, and the figure of *F. coronata* Lam. as figured by Reeve (pl. VI, f. 14 a, b.) Figure 1c and d of Reeve and copied by Tryon (fig. 16) is *F. gigantea*. The *F. crocata* Phil. from Yucatan is undoubtedly the young of this species and not related to *F. filamentosa* as suggested by Tryon.

In regard to its size, Tryon says: "Length 1 to 2 feet. This is the largest known species of univalve shell." Charles T. Simpson (Davenport Acad. Nat. Sci., v, 51, 1886), says: "On the Keys I have seen dead shells two feet in length, the largest Gastropod in the world." In The Nautilus, XIX, 108, I had occasion to review Mr. Charles Hedley's paper, "On a large example of *Megalatractus aruanus* (L.), and incidentally mentioned that this Australian giant had a rival on our Florida coast, *F. gigantea*, quoting one of the above references. Mr. Hedley replied in a letter saying: "Give it in inches, I do not like the sound of the word feet." I remember a specimen 23 inches (about 575 mm.) in length, and there was a very large specimen in the collection of the late Joseph Wilcox which I cannot now locate. In writing to Dr. Dall, he says: "The largest specimen we have of *F. gigantea* measures 20 inches in length, with probably half an inch lost from the tip of the spire and as much more from the end of the canal; I have seen a bigger one but I do not remember the exact length of it. Call ours 530 mm. and it would, I think, be fair." The largest in the American Museum of Natural History is 20.25 inches and that in the Academy of Natural Sciences about the same.

Var. *reevei* Jonas.

This is not a form of *F. princeps* as suggested by Tryon. Although the type is comparatively small (135 mm. in length) the form is easily recognized and not uncommon on the Gulf coast of Florida. It was found by the writer at Marco. The prominent nodes become obsolete or wanting, especially on the body whorl; the shell is also thinner and does not reach the size of the typical form. While *F. gigantea* and *F. princeps* (from the west coast of Central America resemble each other superficially, there is a most remarkable difference in their opercula. The former has only the prominent concentric lines of growth on the exterior, while the latter has five deep longitudinal furrows on the middle and inner edge and irregular diagonal ribs on the outer edge.

The large bunches of egg-capsules of *F. gigantea* are conspicuous objects on the Florida beaches. These are poorly figured by Tryon (Manual, Vol. 2, pl. 7, figs. 78 and 79) as "Capsules of an unknown Muricoid mollusk." A bunch of capsules from Key West, Fla., nine inches in length and containing approximately 400 capsules was attached to a broad band which has no doubt contracted considerably in drying. Three of the capsules contained respectively 66, 70 and 76 embryonic shells. If these should average 70 per capsule, the entire bunch would produce upwards of 30,000 shells, but the death rate is enormous and very few ever reach maturity. Each capsule is wedge-shaped, the angles slightly winged and the sides with five or six irregular ridges. It is about 40 mm. in length, attached to the band by a pedicel about 12 mm. long.

The capsules of *F. tulipa* are in small clusters attached to shells and stones. It is also wedge-shaped and pedunculate, the sides are smooth, but the upper edge is ornamented by numerous undulations around its entire margin. In *F. distans* there is only a single indentation on the upper edge, forming a lobe that extends over the opening through which the young shells escape. The latter is figured by Tryon (Manual II, pl. 7, fig. 77) as *F. tulipa?*

Fasciolaria tulipa (Linné).

Colus achatinus Bolten, Mus. Bolt., 117, 1798. A variable

shell both in sculpture and color. A perfect shell of the smooth or more typical form shows interesting phases in sculpture in the early growth of the shell, the protoconch and about half a whorl of the young shell being smooth, followed by about half a whorl with only longitudinal ridges; this is followed by two whorls with prominent spiral ridges which gradually become obsolete or wanting except near the suture, these subsutural ridges increasing in prominence and often becoming crenulated or beaded on the last two whorls. On the anterior portion of the shell are also prominent spiral ridges. Some of the specimens from the Bahamas have a decided shoulder on the body whorl. Color whitish, mottled with brown or reddish blotches and with from 26–33 dark-brown spiral lines on the body whorl. Two specimens from the West Indies are uniformly light brown with the usual dark-brown spiral lines. Simpson says: "A mahogany-colored form is occasionally found on the Keys." It varies in length from 5 to 8 inches (125 to 200 mm.) and is found from North Carolina to the West Indies and Venezuela.

The varietal name of *obsoleta* was applied to a smooth form from St. Thomas, but this cannot really be separated. There is, however, a form in which the spiral grooves and ridges cover the entire shell. Tryon (Manual III, 74) says: "I figure a rugose form which Dunker intended at one time to describe as *F. scheepmakeri* but finally illustrated in his 'Novitates' as a variety of *F. tulipa.*" This name might therefore be used in a varietal sense for this form which is quite common on the Gulf coast of Florida.

Fasciolaria distans Lamarck.

As pointed out by Dr. Dall and others, this is a good species and not a variety of *F. tulipa* Linn., as stated by Tryon and later by Miss Rogers in the "Shell Book." It is smaller and smoother, having only faint spiral sulcations on two of the early whorls near the nucleus, and spiral ridges on the narrow anterior portion. There is also present an internal ridge on the body whorl in front of the suture. Color whitish, with bluish-gray or brown blotches and usually with five or six equidistant,

revolving, dark-brown lines. One specimen shows ten, but five of these are somewhat obsolete and close together near the narrow anterior portion of the shell. I have found living specimens at St. Augustine, Fla., in which the blotches were a light rose-pink, with the six revolving lines of a similar color. Dr. Dall records, from Belize, a pale salmon-colored specimen with the lines obsolete. The species varies in length from 65–85 mm. It ranges from North Carolina to Florida and westward to Mexico.

THREE NEW ALPINE VERTIGOS FROM CALIFORNIA.

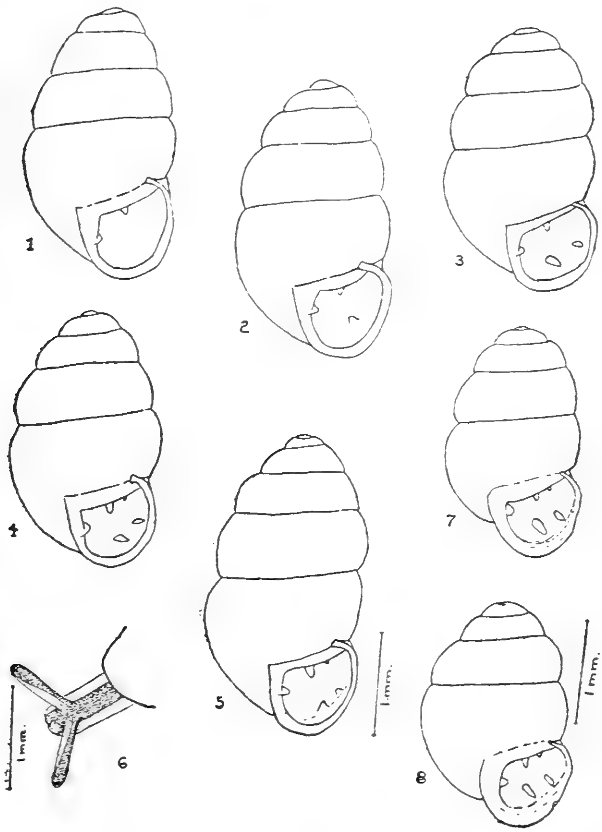
BY S. STILLMAN BERRY.

Among numerous *Pupillidae* collected from the higher mountain regions of California during the past few years appear several apparently undescribed forms, diagnoses of three of which are given below.

VERTIGO MODESTA MICROPHASMA, new subspecies. Figs. 1–6.

The shell is cylindro-conic, rimate-umbilicate, thin, very pale horn color, by transmitted light transparent and colorless. The surface is glossy and distinctly irregularly, obliquely striate, especially on the upper whorls. The spire tapers from the last whorl, at first gradually, then more rapidly, to the obtuse apex. The whorls are strongly convex, the last with an indentation just back of the aperture over the lower palatal tooth, subsequently with a narrow, abrupt, axial constriction, then swollen to form a low, wave-like crest just back of and parallel to the lip. The aperture is rounded triangular, scarcely constricted on the outer margin, the peristome thickened and porcelain white in color, showing through the back of the shell as a white line, but the sharp lip scarcely reflected except over the columella. The posterior angle of the outer lip curves in rather sharply to the body whorl. The number of teeth varies from 2 to 5. The palatal and columellar lamellae are always well developed. In addition there is almost always a well developed lower palatal. A smaller, but variable upper palatal

is frequently present, as also a minute angular lamella. All the teeth are porcelain-white in color.



1–6, VERTIGO MODESTA MICROPHASMA. 7, VERTIGO ALLYNIANA.
8, V. A. XENOS.

Length of type 2.6; diameter to lip edge 1.5; length of aperture 0.9 mm.; whorls 5.

Type: Cat. No. 2740 of the writer's collection. Paratypes in the Academy of Natural Sciences of Philadelphia, California Academy of Sciences, Southwest Museum, United States National Museum, and the private collections of Mr. George H. Clapp and others.

Type Locality: 7,550 feet altitude, cienaga near Bluff Lake, San Bernardino Mountains, California; under sticks and logs at edge of forest; Nina G. Spaulding, G. E. Dole and S. S. Berry, August, 1910; 59 specimens in this and neighboring cienagas.

Also taken at 7,200 feet altitude, west slope of Falls Creek Canyon, near the narrows about one mile above Dobbs Cabin, Dollar Pass Trail, San Bernardino Mountains, California; under small sticks and pine cones on springy slope; G. E. Dole and S. S. Berry, Sept. 29, 1918; 32 specimens.

Remarks: This very puzzling little mollusk is one of the most beautiful of American Vertigos. It is very close to *V. modesta parietalis* and may also be described as an albinistic race of that subspecies, but it is a protean form and some shells are equally close to *V. modesta modesta* or even to *V. m. castanea.* That it is more than a mere "albino" of the recognized type is strongly evidenced by its occurrence in such abundance and at scattered localities, as also by the fact that its distribution is by no means coincident with that of any of the other forms mentioned. Nor, although usually associated, do the white or brown shells occur in any apparent regular ratio. At the second locality above cited diligent outlook yielded but three specimens of the brown *parietalis.* It is evidently a comparatively recent offshoot from the parent stock, but the field evidence is that it already is a race with its peculiar characters heritable to a marked degree.

It seems rather remarkable that such features as the color, shell texture, and similar characters in this form should exhibit such constancy as compared with the variability shown in the development of the lamellae. In 39 specimens of the type lot now before me, 1 has only 2 teeth (columellar and parietal), 15 have 3 teeth (columellar, parietal, and lower palatal), 9 have 4 teeth (an upper palatal usually the one added), and 14 have a full set of 5 teeth. No mature specimens with fewer than 2 nor more than 5 teeth have been noted. This variation in a single well-defined colony (its members having, as shown by the other characters noted, an undoubtedly close phylogenetic relationship with one another) throws a valuable bit of light on the difficulty of attempting the separation of the var-

ious races of the *modesta*-series by means of variations in the number of teeth alone. It chances that the specimen chosen as type is one of the 3-toothed forms.

The animal is bluish-gray or slate in color, the body quite dark, the foot and peripheral portions much lighter and semi-transparent. A rough sketch of the cephalic region of one of the Falls Creek specimens is offered in fig. 6.

Whether the hereditary value of this race is that of a "form" or a subspecies can only be shown by the more detailed study which must be left for the future. Until then the personal equation must necessarily largely govern. In any case it will prove useful to have a name for it.

VERTIGO ALLYNIANA new species. Fig. 7.

The shell is minute, short, robust, ovate-conic in outline, thin, dark reddish-brown in color, with only a dull gloss; weakly, irregularly striate. The spire tapers with increasing rapidity from the last whorl to the obtuse apex. The whorls are convex, the last having a shallow but distinct excavation in the palatal region and a weaker one over the upper palatal tooth, the latter extending to the lip, which thus becomes flattened or very slightly indented on its outer segment. The aperture is pyriform in outline, and would be rather small except for the quite flaring lip, which is little thickened and very fragile at the edge. There are 5 teeth constantly developed in all the material examined. The parietal, columellar, and upper and lower palatal lamellae are well developed, and there is a distinct, though small angular lamella. The columellar is situated well back in the aperture and quite high up on the pillar. The lower palatal is also rather deeply immersed.

Length of type 2.1; diameter to lip edge 1.3; length of aperture 0.81 mm.; whorls $4\frac{3}{4}$.

Type: Cat. No. 3764 of the writer's collection. Paratypes in the Academy of Natural Sciences of Philadelphia, and the private collection of Allyn G. Smith.

Type Locality: Donner Lake, California; A. G. Smith, May 30, 1916; 22 specimens.

Remarks: I am not quite certain of the relationships of this

small *Vertigo*. The texture of the shell, as well as the shape, are strongly reminiscent of *V. occidentalis* Sterki, a more weakly toothed species from the San Bernardino Mountains. None of the other species with which I am familiar require any special comparison. *V. corpulenta* (Morse) has a somewhat similar outline, but otherwise does not seem especially close.

VERTIGO ALLYNIANA XENOS, new subspecies. Fig. 8.

With the preceding occurred a single specimen of a very similar form having the same number of teeth, but differing abruptly in its shorter, much more robust and swollen outline, its more transparent, glossier texture, and lighter brown color. The columellar tooth is placed distinctly further down on the pillar, and the remaining lamellae differ slightly from those of the shells described above both in size and position.

Length of type 2.0; diameter to lip edge 1.5; length of aperture 0.85 mm.; whorls $4\frac{1}{2}$.

Type: Cat. No. 4128 of the writer's collection.

Type Locality: Donner Lake, California; A. G. Smith, May 30, 1916; 1 specimen.

EXPLANATION OF FIGURES.

Figs. 1–5. *Vertigo modesta microphasma* Berry. Camera drawings of type (Fig. 2) and four other specimens of the original lot, showing variation in number of lamellae and shape of shell.

Fig. 6. *Vertigo modesta microphasma* Berry. Camera drawing of cephalic region of living animal as extended in crawling.

Fig. 7. *Vertigo allyniana* Berry. Camera drawing of type.

Fig. 8. *Vertigo* (allyniana var?) *xenos* Berry. Camera drawing of type.

All figures drawn to same scale.

Redlands, California.

A NEW CALIFORNIAN MICRARIONTA.

BY HENRY A. PILSBRY.

MICRARIONTA RIXFORDI n. sp.

The shell is strongly depressed, umbilicate, the diameter of umbilicus contained about 5 times in that of the shell. Embryonic shell of $1\frac{1}{2}$ whorls at first densely pitted, the pitting rather irregular, passing into granulation, and on the last half whorl transformed into short strong wrinkles, roughly parallel to the suture and often anastomosing. Subsequent whorls are delicately marked with growth lines only, moderately convex, the last slowly and rather deeply descending to the aperture, rounded peripherally, and encircled with a brown band above the periphery. The aperture is strongly oblique, irregularly oval. The peristome is thin, basal margin narrowly expanded, columellar margin somewhat dilated, but covering only a very small part of the umbilicus. The parietal callus is very thin.

Alt. 9.5; diam. 16.6 mm.; umbilicus 3.1 mm.; $4\frac{2}{3}$ whorls.

This snail was received too late for illustration in the present number. It was collected by Dr. Emmet Rixford among rocks at the foot of the mountains on the southern edge of the Mojave Desert about 10 miles west of Twentynine Palms, Riverside Co., California. Type and two other specimens, No. 129781 A. N. S. P.

Compared with *M. indioensis* (Yates), which is its nearest neighbor, this species is far more depressed and more openly umbilicate. *M. desertorum* Pils. & Ferr. and *M. hutsoni* Clapp are much smaller related forms from Arizona.

The specimens were picked up dead and except for the shoulder band, show no color.

A NEW CHINESE CLAUSILIA.

BY H. A. PILSBRY.

CLAUSILIA (EUPHAEDUSA) STEETZNERI n. s.

The shell is very slender, slowly tapering, the outlines of the spire straight, very slightly concave near the summit; opaque,

not glossy, vinaceous-russet fading to cinnamon-brown at the early whorls. First 3 whorls nearly smooth, the rest ribbed, the ribs straight, narrower than the slightly striate intervals, about 25 on the last whorl. The upper whorls are rather convex, the penult somewhat and the last strongly compressed laterally. The aperture is small, about one-sixth as long as the shell, piriform, the light brown peristome expanded and slightly reflected. Superior lamella rather small, marginal, oblique, not continuous with the spiral lamella, which is about a half-whorl long. The inferior lamella is situate high, converging to the superior; it ascends in a broad spiral a little past the dorsal line. The subcolumellar lamella is very deeply immersed, not visible in the mouth, but rather strong within the back. The principal plica is rather short, dorso-lateral, its lower end visible with difficulty in an oblique view in the mouth. There are quite short, subparallel upper and lower palatal plicae.

The clausilium is quite broad, curved almost in a semicircle, passing without notch or excision into the filament.

Length 13.6; diam. above aperture 2.4 mm.; length of aperture with peristome 2.3 mm.; 13 whorls.

Wenchuan (Wentschuan), Szechuan, China. Type 44660 A. N. S. P., coll. by Mr. Steetzner, received through Dr. Bryant Walker.

The dull, strongly sculptured surface, small aperture and large number of whorls are the more salient external features of the species, and distinguish it from other Euphaedusae having similar palatal structure, such as *C. planostriata* Hde. It is named for the collector.

A COLLECTING TRIP ON THE ISLAND OF OAHU, HAWAIIAN ISLANDS, BY THE GULICK NATURAL HISTORY CLUB.

BY JOSEPH J. GOUVEIA.

Early Sunday morning on May the 25th, 1919, we started on the first trip planned by the *Gulick Natural History Club*. The purpose of this trip was to give the members of the club an opportunity to work on different lines.

Mr. F. Grinnell, with his necessary paraphernalia, started out prepared to collect plants and insects, while Messrs. Bryan, Emerson, Antone Gouveia and the writer for goats and shells.

The writer and Antone Gouveia took the first car towards Waialae, which leaves Kalihi Street at 5:45 a. m., and, after riding fifty minutes, we joined the rest of the members at the end of the car line.

At 6:45 we started out for Keawaawa. We had about eight miles to go before we could reach the foot of the valley and about three miles to go before we reached our hunting grounds.

The day was clear, and while on our way up the valley the talk was upon different subjects pertaining to the Hawaiian Islands and their history, among them the decrease of the Hawaiian population. When the white people first came to these islands they found them thickly populated with pure Hawaiians. To-day, about two-thirds of the Hawaiian population are half-breeds. Discussing the cause of their disappearance, we agreed that it was due to the following: wars, human sacrifice, pestilence, oppression by kings, chiefs and priests, liquor, wearing of clothing, and amalgamation with white people.

After an eight-mile walk along a hard coral road we reached Keawaawa at 8 o'clock. We were now ready to face a trail well overgrown on both sides with the Glue Bush and Lantana. It is not very pleasant to hike through these on account of their thorns. After about an hour's walk we arrived at the forest, our shelling grounds. On our way up we followed cattle trails which led along the bottom of the valley, and up near the drops we followed a zig-zag trail which wound to the top of the west Keawaawa ridge.

When we reached the outskirts of the forest, Grinnell and Gouveia followed a ravine on the right-hand side going up. This is where our day's collecting began. The following shells were collected in the above ravine:

Philonesia baldwini var. 6 specimens.

Lyropupa magdalenæ 6 spec.

Lyropupa microthauma var. 4 spec.

Lyropupa microthauma var. 6 spec.

Nesopupa plicifera 3 spec.
Nesopupa wesleyana var. tryphera 1 spec.
Tornatellides procerulus var. acicula 2 spec.
Tornatellides macromphala var. 63 spec.
Tornatellaria newcombi 6 spec.
Leptachatina gummea 23 spec.
Leptachatina fusca 3 spec.
Amastra tristis 2 spec.

Edwin Bryan, Oliver Emerson and the writer followed the ridge trail. We collected shells on our way up to the backbone. Shelling is not what it used to be, for shells are very scarce in this section of the Koolau Range. We managed to get seven specimens of *Achatinella viridans:* we considered this a lucky find. While on our way to the backbone, we heard some goats in the valley west of Keawaawa (Kuliouou Ike valley). Mr. Emerson carried a 45–70 caliber rifle, an efficient weapon for reducing the mountain pest.

Mr. F. Grinnell and Antone Gouveia joined the other members at the backbone. After a few minutes the party separated again, and this time we all started off in earnest for our different aims. Emerson and Bryan started across the backbone towards Kuliouou over a narrow goat trail about a foot wide in places; barely enough for one to crawl over, while Grinnell, Antone Gouveia and the writer started east looking for insects and shells. We were not able to find any *Achatinella.* We traveled a little further on until we came to a grove of banana and here we found the following shells:

Nesopupa plicifera 6 spec.
Tornatellides sp.? 4 spec.
Tornatellides macromphala var. 9 spec.
Tornatellaria newcombi 3 spec.
Helicina rotelloidea 18 spec.
Leptachatina gummea 7 spec.
Amastra tristis 1 spec.
Succinea rotundata 1 spec.

We spent about forty minutes collecting and then returned to the main ridge. On our way back we stopped about three hundred feet east of the Kuliouou-Keawaawa ridge and hunted

on bunch grass about 18 inches high. Here we collected the following:

Nesopupa boettgeri 5 spec.
Pronesopupa acanthinula 5 spec.
Tornatellides leptospira 16 spec.
Tornatellides brunneus 9 spec.
Tornatellides brunneus var. 3 spec.
Philonesia baldwini var. 6 spec.
Auriculella diaphana 20 spec.
Leptachatina gummea 2 spec.

At 11:30 we ate lunch and after half an hour's rest we started out again; this time we worked down the first ravine east of the main West Keawaawa ridge. While on the backbone ridge we noticed some kukui trees (*Aleurites moluccana*) which looked very promising. On our way down the valley to these kukui trees we collected the following shells:

Nesopupa plicifera 2 spec.
Tornatellaria macromphala 3 spec.
Tornatellaria newcombi 2 spec.
Helicina rotelloidea 1 spec.
Amastra eos 48 spec.
Amastra tristis 31 spec.
Leptachatina gummea 27 spec.
Leptachatina fusca 12 spec.

After spending about an hour collecting these we headed for the kukui trees. We found a few dead specimens of *Achatinella phæozona* under these trees, and, after a careful search we found twelve live specimens. Two were found on Lantana and the rest were found near the tops of the kukui trees. It was a surprise to us, for we were told that these shells were extinct in Keawaawa. On Lantana and oee weed we found thirty-two specimens of *Achatinella viridans.* Some of them were dark-brown in color and many of them had broad white and light-brown bands around the last whorl.

This was a good find. The forest is dying away fast and in the course of time these shells will be extinct. About three years ago the writer and Antone Gouveia collected a few dead

specimens of *Achatinella viridans* in the valley east of Keawaawa. These shells once thrived there, but the trees that they lived on have died away and consequently the shells have died off with them.

We all met at the foot of one of the small ridges at about 4 o'clock, ready for our homeward journey. Messrs. Emerson and Bryan had returned from their hunting trip. They were successful in wounding a goat and collecting a few specimens of *Achatinella viridans* on the windward side of the backbone ridge. Mr. Grinnell collected some interesting insects and native plants. After two long hours' walking at a good gait, we reached the car line, and about 6 p. m. we boarded the car for home.

Thus the *Gulick Natural History Club* finished its first trip with quite a success in the collecting line.

The shells listed were identified by Dr. C. Montague Cooke, Jr.

A NEW VARIETY OF OLIVA SERICEA MINIACEA.

BY H. C. HIGGINS.

Having become greatly interested in the Olividae, their beauty and the great variation of the species are to me a never-ending source of pleasure, marred only by the many perplexities in nomenclature. To what extent names should be given to the various forms, authors differ in opinion, but it seems more convenient to refer to certain well-marked forms by name when they are well figured in standard publications, than to say a variation of *O. sericea* subspecies *miniacea* figured in the Thes. Conch., Vol. IV, pl. 7, f. 110.

Having brought together a remarkable series of 250 specimens of *Oliva sericea* (*tremulina-miniacea* group) showing all the named varieties as well as many intermediate specimens, I was impressed with the fact that a shell in the *miniacea* group corresponding to variety *pica* in the *tremulina* group, has no varietal name, therefore I propose the name *Oliva sericea miniacea* var. *johnsoni* for this shell, in honor of Mr. C. W. Johnson, curator of the Boston Society of Natural History, as a slight acknowl-

edgment of his untiring work with, and published articles on, the Olividae, as well as for the kindly interest he has taken in my own collection of *Oliva*, and the assistance given me in identifying specimens.

This variety is figured by Marrat in Sowerby's Thesaurus Conchyliorum, Vol. IV, pl. 7, f. 110. It is represented in my collection by six specimens of which one, no. 1652, has to be selected as the type.

COLLECTING IN THE VICINITY OF NEWARK, NEW JERSEY.

BY FRED TABLEMAN.

During 1917–1918 I decided to study the molluscan fauna in the vicinity of Newark, N. J. Limiting myself to twenty cents car fare for each trip I started to see what I could find within this area.

Most of the work was done in Essex County, in one instance within walking distance from my home. Visiting the Newark Meadows I found a station for *Polygyra thyroides* by seeing some dead shells. I looked for live specimens but could not find any owing to the density of the underbrush and flies. Going later when they were hibernating I collected about 150 and could have gotten more. They live under debris that is overgrown with the balloon-vine on which I believe they feed. This station has been destroyed by the opening of the Port Newark Terminal.

The next place visited was Great Notch Brook, Upper Montclair. On this brook is a small pond formed by a dam at the head of which in a marshy place I found *Lymnaea palustris* in great quantities, and also one specimen of *Pseudosuccinea columella.* I was fishing at the time and ran short of bait, so turning over a rotten log I got not only bait but a nice lot of *Pyramidula alternata*, which are now in my collection. Going to the same place later in the season and exploring one of the mountains as far as possible, I obtained a few small *Pyramidula alternata* and two *Polygyra albolabris*, one dead and one living.

Going to Cable Lake, West Orange, I collected *Planorbis antrosus.* The lake is a small one situated on the top of a mountain, the shore of which is partly sand and stones. Here is the home of the Planorbes, which are covered with algae.

The Rahway River, in Union Co., was next visited in search of Unios. Two specimens of *Anodonta cataracta* in perfect condition were secured, but further search failed to produce more of that species; but about fifty *Unio complanatus* were obtained. I also collected *Physa heterostropha* along the bank in company with *Lymnea palustris*, and in the shallows *Campeloma rufum* was found in company with a small variety of *Planorbis trivolvis* and *Sphaerium* sp.

The last three trips to Bloomfield proved the best. The collecting was done in Great Notch Brook which flows through part of the town where it comes from Brookdale. Starting at the end of the trolley line and working up stream I found small dead *Planorbis trivolvis* that had been washed in hollows and crevices among the stones. Live ones were gathered farther up stream and also *Unio complanatus*, which I will compare with the Rahway River shells later.

Going still further up stream, I found the first specimens of *Goniobasis virginica* in the shallow water near the bank; also broken *Campeloma decisum*, later two perfect specimens were found. The Goniobasis were large specimens ranging up to an inch in length, many of them so eroded as to be hardly recognizable except by the animal itself. Still further up the *Goniobasis* became more plentiful and also *Lymnaea palustris*, both alive and dead in the drift, which was composed of the dead of both and a few valves of Unios.

The Lymnaeas were found on the stems of water plants and also floating on the surface, foot up; the Goniobasis were clinging to the stones and crawling on the bottom. Both the smooth and ribbed variety (*multilineata*) were found, both banded and plain. More Unios were found, so I returned home satisfied with the afternoon work.

On the last trip I found but few specimens of *Goniobasis.* A heavy rain a few days before had made the stream moderately high, and the few specimens that I obtained were buried ver-

tically in the sandy bottom with the body whorl only exposed. I do not know whether they buried themselves or the shifting sands did.

The *Unio complanatus* collected varies greatly with the locality. Those from the Rahway River are cleaner than those from Notch Brook and are not so ventricose. The anterior end is more elongate than the brook form, and the sexes are hardly distinguishable. The Notch Brook females are much shorter than the males and more truncated, as the following measurements of the largest specimens show:

Locality.	Sex.	Length.	Breadth.	Thickness.
Rahway River . . .	Male.	70 mm.	35 mm.	18 mm.
	Female.	75 mm.	38 mm.	20 mm.
Great Notch Brook.	Male.	72 mm.	38 mm.	19 mm.
	Female.	63 mm.	40 mm.	19 mm.

Having collected only in two localities this year I obtained the following species. From Branch Brook Park, Newark, *Planorbis parvus* and *Planorbis antrosus*. These species were found in shallow water near the shore.

At Halcyon Park (Bloomfield) in a small pond, if it can be called such, I found large *Planorbis trivolvis*, the largest of which measures 25 mm.; also *Pseudosuccinea columella* and a species of *Ancylus* which I have not identified. I believe the shells in this pond came with the water-lilies that are growing there.

SHELLS OF LA JOLLA, CALIFORNIA.

BY C. R. ORCUTT.

My acquaintance with La Jolla dates back to 1879, when there was not a human habitation on the coast from San Dieguito on the north to the old lighthouse, 500 feet above the beach, at the extremity of Point Loma at the entrance to San Diego Bay. Now there are several flourishing towns along the way, the delight of summer and winter tourists, among whom not a few have been conchologists.

Taking charge of Hotel Strand at La Jolla in July, 1918, I have since busied myself quite as much with the molluscan fauna of La Jolla as with the hotel business, with some interesting results.

Mr. Maxwell Smith has contributed a list of La Jolla shells to THE NAUTILUS (volume 21, pages 55 and 65), and Mr. Joshua L. Bailey, Jr., has contributed a supplementary list (on page 92). A few additional notes may be of interest.

Haliotis fulgens.—In the spring of 1916 San Diego was visited with great floods, and a great amount of silt was washed into the ocean via San Diego and False Bay with the fresh water. This proved to be fatal to many mollusks, and I am told that many thousands of this shell were washed up along the shore from False Bay to La Jolla. One gentleman told me that a train of cars could have been filled with these shells which were piled a foot deep on the beach in many places. Another filled two sacks with the shells and nearly broke his back tugging them to the top of the cliff at what in early days we called Seal Rock, now named Bird Rock Beach. These he has finally placed at my disposal, and I found the two sacks full chiefly of this species. *Haliotis cracherodii* and *H. rufescens* were missing, as well as *H. assimilis.* Out of the lot I found six specimens of the following species and nine specimens of its variety.

Haliotis corrugata.—These were not very strongly corrugated, but properly referable to the species.

Haliotis corrugata diegoensis.—This form differs in the entire lack of the corrugations typical of the species, but otherwise

with nearly the same characters. All of the corrugated specimens possessed three holes, while of the nine specimens of this variety one had one hole, two had two holes, and the rest had three.

Haliotis californiensis.—The Japanese gardeners at La Jolla are good fishermen also, and frequently gather abalones for the meat. One of them gave me a specimen which for lack of a better name I have given the above name. It is 5¼ inches long, 4⅝ across, 2 high, and has 11 small nearly circular holes outside, showing traces of two closed holes. The inside contains a large "pearl" or muscular impression, triangular in shape, and instead of the clear pearly white of *H. cracherodii*, there are large blotches of brown, green, blue and pink iridescence. I have had many similar specimens from the west coast of Baja California, which have never been determined to my satisfaction. Dr. Stearns I believe tentatively referred them to the above species of Swainson.

Caecum orcutti Dall.—This seems to be absent from the lists given in THE NAUTILUS. The type locality was at a point about two miles south of La Jolla's caves, where under a flat rock I must have found more than 100,000 examples of this minute species. I have sent the U. S. National Museum what I estimated as near 50,000 specimens, which 1 believe breaks the record for any single collection in this genus. It has been found at San Pedro, Cal., I believe, and at Todos Santos Bay, Baja California.

Helix pisana.—This snail has been recorded in THE NAUTILUS as from La Jolla (though not in the lists referred to above). The first of September, 1918, I found it for the first time, and reported its occurrence as a menace to California horticulture. A representative of the County Horticultural Commission counted nearly 800 living on one bush about a foot high with a spread of three feet. A dozen would frequently be found on one stem of the wild oak. It seemed to have no preference, but was abundant on native and cultivated plants alike, and thousands were observed on the sides of the cement curbing and on the sides of houses near by. But the tens of thousands observed were apparently confined to a district less than half a

mile in extent in any direction. The authorities attempted their destruction, but I have noticed hundreds yet remaining alive. It was first reported to our local society of natural history in 1914, when three specimens donated were "all that could be found."

Bifidaria hemphilli.

Bifidaria calamitosa.

Vertigo californica diegoensis.

Some years ago Mr. Henry Hemphill told me that there were no Pupas in this region, stating as his belief that they could not exist in our arid climate. Then I found a few under the stem of a decaying yucca on the mesas back of San Diego, and later more than 500 under some decaying cacti in the same vicinity. Still later individuals were found not at all rare on decaying plants on the seashore not far south of La Jolla, chiefly on the Hottentot Fig or Beach Strawberry (*Mesembryanthemum æquilaterale*). These were found at Pacific Beach and no doubt exist within the limits of La Jolla, if one will search with care.

Helix traskii Newc.

Helix tudiculata Binn.

These are apparently not rare in the environs of La Jolla. The first was not previously reported.

Helix aspersa Müll.—Mr. Smith reports that he turned a few dozen of these loose at La Jolla. They now exist by the tens of thousands and are very destructive to the vegetables in the gardens. Some way should be found to make Mr. Smith take them away. It seems to be a different form from the one now naturalized in San Diego gardens, where it is also a much hated pest.

Mytilus californianus.—*Modiolus californiensis* of Smith's list was doubtless an error for the above, which occurs plentifully on our coasts. Just south of the international boundary this species has yielded many pretty pearls. The larger shells measure about seven inches long.

Schizothaerus nuttallii.—This favorite clam was formerly abundant in a bed of rocks just inside the entrance to False Bay, which was formerly the home of many choice shells. This was the type locality of *Chlamydoconcha orcutti*, since reported from Monterey Bay by Dr. Berry.

Semele decisa, Saxidomus nuttalli and other bivalves were equally abundant, but now nearly exterminated. A list of the mollusca from this bed would be extremely interesting, but now hopeless of ever being written, as it is no longer the ideal home for mollusks that it once was. Over 100 *Cypraea spadicea* were found there in one day, and an equal number of *Ranella californica* were yielded by the adjacent sandy beaches. While the shells from this lagoon do not properly belong with the La Jolla list, yet fragments or dead specimens of all noted by Mr. Smith may occasionally be found at La Jolla.

Tagelus californianus.—This is extremely abundant in False Bay and is gathered in quantities for bait by fishermen, and thus the shells are scattered freely all along the La Jolla shores.

Pedipes unisulcata.—Smith reports many of the dead shells attached to sea anemones, but I found it years ago in company with *Truncatella stimpsoni* on round water-washed boulders in caves near La Jolla.

Pedipes liratus.—This was also found at La Jolla in early days and later by Prof. Kelsey.

Milnerea minima.—Abundant. Attached to the under side of stones. Usually reported as living on the shells of Haliotis.

Mytilus adamsianus.—This was long called *M. bifurcatus*, later known as *M. stearnsi.* Smith and Bailey, like many other collectors, seem to have overlooked it, probably mistaking it for the young of *Septifer bifurcatus* which it nearly resembles, except for the absence of the septum. It is equally abundant.

Mytilus denticulatus.—This is similar to the last but much smaller. It is *Modiolaria denticulata* of former lists, and might easily be overlooked, but is apparently not rare on our rocks.

Adula diegensis.—North of the Scripps Biological Station about a mile north of La Jolla is a rocky beach at the base of high cliffs. Much of the rock is a soft clay stone, and perforated by millions of pholads. In places this species has entire possession, and often they have made their cells so close together that no partitions of rock are left to separate the shells.

Pholas pacifica.—This is one of the pholads found at the above station with others already noted.

Petricola denticulata.—This is extremely abundant in the

above locality also, square yards of surface of some of the flat rocks being filled with its shells. This species seems to abound from San Pedro, Cal., to Magdalena Bay, Baja Cal., where I found millions of the young shells in the drift (determined by Dr. Dall).

Acmaea patina cumingii.—This is the commonest species at Bird Rock and all along our coast, but seems to have been overlooked by Smith and Bailey.

Tegula ligulatum.—One of the commoner shells on all our beaches.

Pecten hastatus.—In kelp holdfasts washed ashore at Pacific Beach.

Pecten hericeus.—Valves frequent in the drift.

Phacoides californicus.—Frequent in the drift on all our beaches.

Phacoides richthofeni.—Valves occasionally washed ashore. Mr. Emery found it living in False Bay.

Fissurella volcano.—This is probably one of the most abundant and widely distributed species on our coast. I have generally looked with contempt on the gathering of dead shells; but for lack of better material I have gathered several thousand of this from the drift, from very minute to specimens of maximum size. It occurs from Monterey, Cal., south at least as far as Salina Cruz, Oaxaca, where I have collected it in abundance. The beach-worn shells show a beautiful diversity of color not observable in the living shells. About fifteen per cent. of the shells picked up at La Jolla are of the var. *crucifera* Dall, sometimes the arms of the cross extending only halfway down the sides of the shell, sometimes wholly worn away at the apex, often one or more arms missing; in young specimens, say 2 mm. long, frequently only the lateral white arms appear halfway to the lower margin of the shell. The ground work is usually reddish, the gray or black forms being much rarer. From the four white arms of var. *crucifera* there occurs every variation in number up to 20 or 30 or more, the red rays on a white ground—like red-hot lava flowing down the sides of a mountain, having given it its name. This is probably the typical form.

Acmaea triangularis.—One specimen detected in the drift on the beach.

Calliostoma supragranosum Cpr.—Detected in kelp holdfasts.

Cyanoplax hartwegii.—Perhaps our commonest chiton, on rocks near high-water mark, strangely omitted from Smith's list.

Columbella fuscata.—One specimen was found living years ago, but no doubt estray from southern waters as well as a single well-developed living specimen.

Thais biserialis, not rare.
Corbula luteola, not rare.
Crepidula rugosa norrisianum.
Crepidula unguiformis.
Crepidula dorsata.
Hipponyx antiquatus.
Hipponyx cranioides.
Hipponyx tumens.
Kellia laperousii.
Kellia suborbicularis.
Modiola capax.
Mytilimeria nuttallii.
Pecten latiauritus.
Psammobia californica.
Saxicava arctica.
Saxidomus nuttallii.
Terebratella transversa.
Thracia curta.
Thracia squamosa.
Transennella tantilla.
Turbonilla castanella.
Odostomia aequisculpta.
Venerupis lamellifera.
Mactra californica.
Mactra falcata.
Mactra nasuta.
Mactra planulata.
Phacoides nuttallii.

The above are some of the shells omitted from the lists referred to that I have noted on the beach, quite a number of them in kelp holdfasts washed ashore.

A considerable number of minute shells yet undetermined will add considerably to the list, besides several chitons and larger shells that are being studied.

LA JOLLA, CAL., *21 Dec., 1918.*

LAND SHELLS OF LAUREL SPRINGS, NEW JERSEY.

BY E. G. VANATTA.

The following species of land shells were picked from forest debris collected by Mr. Bayard Long on the north branch of Timber Creek, at Laurel Springs, Camden County, New Jersey, during 1918 and 1919.

Polygyra fallax (Say).
Polygyra albolabris (Say).
Polygyra thyroidus (Say).
Strobilops floridana Pils.
Pupoides marginatus (Say).
Gastrocopta corticaria (Say).
Gastrocopta contracta (Say).
Gastrocopta armifera (Say).
Gastrocopta pentodon Say.
Vertigo tridentata Wolf.
Vertigo milium Gld.
Vallonia pulchella (Müll.).
Columella edentula (Drap.).
Polita hammonis (Ström.).
Polita indentata (Say).
Striatura milium (Morse).
Euconulus fulvus (Müll.).
Zonitoides arborea (Say).
Zonitoides minuscula (Binn.).
Zonitoides minuscula alachuana Dall.
Agriolimax campestris (Binn.).
Pyramidula alternata fergusoni (Bld.).
Pyramidula cronkhitei anthonyi Pils.
Helicodiscus parallelus (Say).
Punctum pygmæum (Drap.).
Succinea ovalis Say.
Carychium exiguum Say.

PUBLICATIONS RECEIVED.

Observations on Living Lamellibranchs of New England. By Edward S. Morse (Proc. Boston Soc. Nat. Hist., Vol. 35, no. 5, July, 1919). In this valuable memoir Professor Morse describes and figures the expanded animals of 48 species of New England lamellibranchs. Hitherto most of the work on these mollusks has been done with alcoholic examples, which in their contracted condition give little idea of the beautiful and elaborate structures guarding the siphon openings and mantle edges of the living animal. Only those who have attempted to draw living mollusks can appreciate the application and patience required,—they are often stubborn, and refuse to show off; but all will admire the beautiful line drawings of these graceful structures. The figures of Solemya, Nucula and Yoldia are especially interesting. Some of the genera have the foot remarkably specialized.

Professor Morse takes the occasion to land a few resounding whacks on the nomenclature shifters. It is obvious that many of the changes (such as the adoption of Bolten's very German catalogue) were unnecessary and detrimental to science; yet

other changes mentioned were surely essential to progress. We might even recall that Morse himself threw a grenade into the nomenclature of land and fresh-water shells in his Maine Catalogue of 1864.—H. A. P.

Descriptions of New Species of Mollusks of the Family Turritidae from the West Coast of America and Adjacent Regions. By Wm. H. Dall (Proc. U. S. Nat. Mus., Vol. 56, pp. 1–86, pls. 1–24, 1919). A very exhaustive faunal work on this family. Over 200 species are considered, of which 181 are new. The illustrations are excellent, many of Carpenter's species being figured for the first time. In regard to the family name Dr. Dall says: "Some question having been raised as to the spelling of the family name which I have retained as first proposed by Henry and Arthur Adams in 1853, I submitted the question of Turridae *versus* Turritidae to two expert Latinists, who after due consideration of all the data, concluded that, while either was correct, the latter term under the circumstances was to be preferred."

Pelecypoda of the St. Maurice and Claiborne Stages. By G. D. Harris (Bull. Amer. Paleontology, Vol. 6, 1919). A valuable contribution to American Paleontology. The work contains 268 pages and illustrated by 59 plates, every species and variety being figured. About 250 species and varieties are described, of which more than 50 are new. Two new subgenera—*Mauricia* and *Pachecoa* are proposed. The work is dedicated by the author to the Hon. Truman A. Aldrich.

Sexual activities of the Squid, *Loligo pealii* (Lea). By Gilman A. Drew (Journal of Morphology, Vol. 22, No. 2, and Vol. 32, No. 2). An extremely interesting and well illustrated account of phenomena rarely observed. The second paper deals with the structure and activities of the spermatophore. The observations were made upon specimens kept in aquaria at Woods Hole, Mass.

NOTES ON WEST AMERICAN CHITONS, II. By S. Stillman Berry. Proc. Cal. Acad. Sci. (4), IX, 1919. In this well considered and fully illustrated paper the following new forms are described.

Leptochiton (Xiphiozona) heathi, off Monterey.

Hanleya spicata, Monterey Bay.

Mopalia phorminx, Monterey Bay.

Mopalia egretta, Forrester Island, Alaska.

Ischnochiton (Lepidozona) asthenes, White's Point, Los Angeles Co., Cal.

Various points of classification are considered, and *Rhombochiton*, a "new group to rank near or under *Lepidozona*, with *L. regularis* (Carpenter) as type" is proposed.—H. A. P.

NOTES.

SHELLS FROM THE CHIRICAHUA MOUNTAINS, ARIZONA.—Dr. Witmer Stone camped in Pinery canyon, on the western slope of the Chiricahua Range, from June to August of this year, studying the distribution of the fauna and flora. Near the top, in the forks of the head of the north branch of Pinery canyon, at approximately 6500 to 7000 ft., he obtained the following snails. The locality is near the high ridge separating Pinery from White Tail canyon, where Ferriss and the writer collected in 1906 (Proc. A. N. S., Phila., 1910, p. 75, fig. 6). The rock is limestone.

Sonorella virilis leucura P. & F.

Oreohelix chiricahuana obsoleta P. & F.

Ashmunella duplicidens Pils.

Holospira cionella intermedia P. & F.

Polita indentata umbilicata (Ckll.).

Gastrocopta ashmuni (St.).

Gastrocopta dalliana (St.).

Gastrocopta pilsbryana (St.).

The last three were found in debris, but some living specimens of all the others were taken.—H. A. PILSBRY.

Helix hortensis: I am sending under separate cover a specimen of *Helix hortensis* Müller. It was found in a prehistoric shell-heap on Mahone Bay, about 75 miles west of Halifax, N. S.—W. J. Wurtemberg.

A Synonymical Note: The shell described and named by Pilsbry and Bryan in The Nautilus, XXXI, 3, 1918, p. 99, pl. IX, as *Drupa walkeræ* from Honolulu Harbor, is the same species which was described by G. B. Sowerby in the Annals and Magazine of Natural History, Ser. 8, Vol. XVI, p. 166, pl. X, 1915, as *Pentadactylus fusco-imbricatus*. A recent letter from Sowerby and Fulton suggested this after an examination of a specimen sent to them. A careful comparison of the descriptions and figures convince us of the same conclusion. All the specimens known are from the Honolulu Harbor dredgings from May to August, 1915. The teeth vary from 5 to 7 in the specimens before us. We hope to make a study of the variations of this and other shells later.

F. Grinnell, Jr.,
J. M. Ostergaard.

Insect larvæ destroying Physa.—There is a small artificial pond in Waveland Park which joined my former home grounds in Des Moines, Iowa, that I had never considered of much importance conchologically, owing to its small size and rather recent construction. A visit to it one day in the summer of 1907, however, only added greater strength to Mr. Simpson's motto, "Look everywhere."

I found here a form of *Physa integra* Haldeman quite plenty, but nearly all dead. They were enveloped in what at first appeared to me to be a growth of moss, but which Dr. C. M. Child of the Department of Zoology, University of Chicago, pronounces as insect cases, "probably some dipterous insect, but none of the men in the Department are able to identify more exactly the insect that is responsible for them." As I have heard nothing further, it is fair to presume that the insect is new or little known.

The deposition and multiplication of these microscopical in-

sect larvæ and their cases had in many instances formed a thick mass over the entire surface of the shell, completely closing the aperture, thus causing the animal within to die. Scarcely a living individual could be found that was not more or less infested in this manner.

Burr-oak trees stand near the margin of the water, and the acorns which had fallen from them in the water were often brought out with my little hand-dredge together with cockle-burrs, in company with the infested shells. The cockle-burrs were often difficult to distinguish from some of the shells, covered as they were with the larvæ cases.

When closely observed, I noticed that the majority of the dead shells were lying on the bottom of the pond with aperture up; some could be seen lying in this manner with but a slight opening remaining in the aperture, in which I could see the yet living animal struggling for freedom.

A few living ones were to be found on the vegetation growing in the water which were in all stages of infection.

I revisited the pond in the fall, after the warm weather, and found a few living shells and plenty of recently dead ones; but scarcely a vestige of the insect cases was to be seen anywhere, thus showing that they flourish during the hot weather and after maturing the cases soon decayed, leaving no trace of the perpetrator that so rapidly devastated the colony.—T. Van Hyning.

Polygyra plana bahamensis Van. n. var.—This variety is distinguished from the typical *P. plana* (Dkr.) of Bermuda by frequently having a spiral internal lamina as in *P. cereolus carpenteriana* (Bld.) of Florida. The surface of the spire has finer sculpture than *P. carpenteriana* (Bld.'s) and a trifle coarser than the typical *P. plana* (Dkr.).

The types are in the collection of the Academy of Natural Sciences of Philadelphia, being tray number 44463, from Current Settlement, Eleutha, Bahama Islands, collected by Mr. C. J. Maynard in 1897.

The Academy's collection contains other specimens of this variety from New Providence and Inagua Islands.—E. G. Vanatta.

THE NAUTILUS.

Vol. XXXIII JANUARY, 1920. No. 3.

GONIOBASES OF OHIO.

BY CALVIN GOODRICH.

Some months ago I had occasion to map the known distribution of *Goniobasis livescens* Menke and *G. semicarinata* Say within the borders of Ohio. This distribution is somewhat peculiar.

Beginning on the western side of the state above the central line we find that *livescens* is the *Goniobasis* of the Maumee river system and of the shallows of Lake Erie as far as Sandusky Bay, where *G. haldemanni* occurs in company with *livescens* in the drift of the beaches. So far as exploration thence east shows, *livescens* appears alone to the northeastern corner of Ohio. It is the species of Sandusky River, flowing into Sandusky Bay, of Rocky and Cuyahoga Rivers which enter the lake at Cleveland, and of Conneaut Creek near the eastern border. Below the divide between the lakes and the Ohio River drainages, I found *livescens* in Beaver Creek, a tributary of the Wabash. There is then a great gap in its occurrence until the Hocking River is reached, east of a north and south central line drawn through the state. Just east of this, again, *livescens* has been collected in the Tuscarawas River of the Muskingum system by Dr. Sterki, and in at least one of the Tuscarawas branches. The *G. gracilor* Anth. of the Summit county lakes is plainly an offshoot of *livescens*, as indicated by connecting forms taken in this same region.

Goniobasis semicarinata, less variable and more easily recognizable even in the field than *livescens*, is the species of the Great Miami, Little Miami and the Scioto Rivers, all in the

Ohio River drainage. Between the Scioto and the Hocking Rivers is a fairly large stream known as Raccoon Creek. It is now polluted with mine waste and at the time of my visit to it three or four years ago I found no living mollusks in the creek, and only one or two dead Unios.

East of the Muskingum system is the Mahoning River and Beaver Creek, crossing the Ohio border into Pennsylvania. I know nothing of the *Goniobases* of these streams, but suspect that if any occur in them it is *G. pennsylvanica* Pilsbry, the *Goniobasis* of the upper Ohio rivers.

The chart of this distribution shows that *livescens* crosses the northern section of Ohio in the drainage of the Great Lakes and down two streams of the Ohio River drainage. *Semicarinata* occupies the three largest streams of the Ohio River drainage from the Scioto at about the center to the Great Miami, discharging at the southwest corner of the state.

If we grant that the same laws which have governed the repeopling of Lake Erie with Naiades have controlled in the case of *livescens*, this species entered the Maumee River through the Wabash, spread eastward to the Niagara and beyond. It managed—by means which the geologists might explain—to cross the divide between the Cuyahoga and Tuscarawas River, possibly thence into the Hocking.

Other species of *Goniobasis* than those mentioned have been recognized as occurring in Ohio, and other local races may yet be described, but I feel certain they can all only prove to be descendants of the two parent stocks, *livescens* and *semicarinata*.

SOME LARGE SPECIMENS OF ARGONAUTA.

BY CHARLES W. JOHNSON.

The largest species, or the largest example of a species, is always a subject of special interest, both to the biologist and the collector. Individual variation is not fully understood and cannot always be attributed to favorable or unfavorable environment, or the abundance or lack of nutrition. Individual variation has often led to arguments among conchologists as to

whether certain species dissolve their shells and construct new ones as their bodies increase in size.

A large example of an Argonauta in the collection of the Boston Society of Natural History has been frequently referred to in literature. At a meeting of the Society, held March 15th, 1854 (Proc. Boston Soc. Nat. Hist., vol. 5, p. 35), it was recorded that "Dr. A. A. Gould made some remarks upon the collection of shells presented to the Society by the family of the late Col. Perkins. * * * To one shell in particular he called attention, the large Argonauta, commonly called Paper Nautilus, and which is the largest specimen known to exist. Its measurements are 11¾ by 7½ inches; the next largest specimen in the Museum of the College of Surgeons, London, measures ¾ of an inch less than this. This large specimen was brought from the Indian Ocean."

In the same vol., p. 370, this shell was again referred to under the title "On the Animal of the Argonauta Shell," by John C. Warren. He says: "The beautiful specimen of the *A. compressa* Blain. presented to the Society by Col. Thomas H. Perkins was also exhibited; this shell, which cost him $500, is, according to Dr. Cabot who has made the comparison, the largest Argonauta shell in any cabinet in Europe or America. D'Orbigny in his great work gives as the measurements of the largest he has examined: greatest length of the shell 9½ inches, while our specimen is 10 inches; greatest diameter of the opening 6⅙ inches, in our specimen it is 6½ inches; greatest width of the opening, including the auricular appendages, 3 inches, while in ours it is four inches."

In the Structural and Systematic Conchology, vol. I, p. 151, Tryon says: "The Boston Society of Natural History possesses an *Argonauta argo* or Paper Nautilus shell, which is said to have been purchased for $500 by the gentleman who presented it to that Society. It is a common species, and the only reason for the great valuation of this specimen is that its diameter is about two or three inches greater than any other individual known to naturalists."

Tryon again refers to this specimen in the Manual of Conchology, vol. 1, p. 136. This specimen was later figured and

mentioned in the Bull. No. 9 of the Boston Society of Natural History, April, 1917, where the exact size, 10$\frac{3}{8}$ in greatest diameter was given, as there was a discrepancy of 1$\frac{3}{4}$ inches in the two accounts in the Proceedings. The writer is indebted to the Society for the use of the figure illustrating this article.

In regard to the nomenclature, it seems hardly necessary to enter into any discussion when we consider that we are not dealing with a true shell, but a shell-like structure confined to the female, and only in part a secretion of the mantle, for a portion of it is formed by the two expanded tentacles. Internal partitions are lacking and the structure serves as a nest for the eggs. Tryon, in the Manual of Conchology, places the Indo-Pacific *A. compressa* Blainville (*A. maxima* Gualt.) in the synonymy under *A. argo* Linn., of the Mediterranean. In the absence of a thorough knowledge of the animals it seems best to keep the various forms described from distant regions separate until such time as future investigations prove them to be either the same or distinct.

In this connection I would like to call the attention of readers to a rival of the above specimen. It is a very large example of *Argonauta nodosa* Solander, in the American Museum of Natural History, New York, and measures 8$\frac{5}{8}$ by 11 inches. I am indebted to Mr. Arthur Jacot for these measurements.

SOME AURICULIDAE AND PLANORBIDAE FROM PANAMA.

BY HENRY A. PILSBRY.

The Panamic fauna has a particularly rich and interesting group of Auriculidae. The following new forms were found among the species collected by Mr. James Zetek.

DETRACIA ZETEKI, n. sp. Figs. a, b, c.

The shell is oval with short, almost straightly conic spire and minute, mucronate apex; dusky buff, the spire, a band near the suture and another near the base, carob brown. Surface glossy, rather closely marked with ripples of growth. Whorls of the spire narrow and flat, the greatest convexity of the last whorl above the middle. Aperture extremely narrow, having a

white, lirate callus a short distance within the outer lip. The very short columella bears a thin, wide, entering and descending lamella. Above it, on the lower part of the parietal wall, there is a low, subtriangular callus. It is much more prominent in young than in adult shells.

Length 8.6, diam. 5, length of aperture 6.7 mm.; 11 to 12 whorls.

Panama City and Paitilla, near by.

This species is very peculiar by its many narrow whorls, very narrow aperture, and the large, inwardly descending columellar lamella. It seems remarkable that it was not found by Professor Adams, but nothing described in his catalogue agrees with it. Perhaps it is his unidentified No. 316.

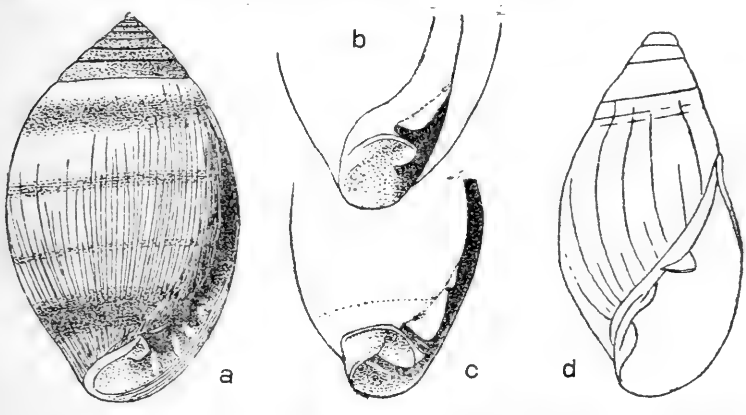


Fig. *a* represents the type; fig. *b* is the basal part of the same specimen rolled more towards the left. Fig. *c* is the lower part of a young specimen, to show the larger lamellae of that stage.

PHYTIA BREVISPIRA. Fig. d.

The shell is oblong-conic, not very solid, cinnamon-brown, glossy marked with weak growth-lines only. The spire is straightly conic, shorter than the aperture; whorls very slightly convex, the last somewhat concave below the suture, with one or two spiral lines in the concavity defining a wide sutural margin. The aperture is pinched in above, becoming moderately wide and rounded below, the outer lip thin, without in-

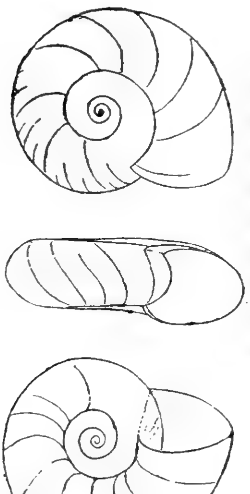
ternal folds or callus. There is a strong, deeply entering diagonal parietal lamella, a smaller one below it; columella terminating in a spirally entering lamella.

Length 8, diam. 4.1, length of aperture 5.1 mm. (fig. d, apex lost).

Panama City and Paitilla, near the city, collected by James Zetek, 1917. Also Taboga Island.

This species stands near *P. triplicata* (Anton) and *P. acuta* (Orb.) both of which have similar teeth. It is, however, decidedly narrower than the first, wider than the second, so that while I hesitate to add another species to this genus, it appears that none of those described will receive it. *Phytia rhoadsi* (Pils.), described as a *Marinula*, and *P. setifer* (Caop.) are more northern species, the former somewhat related to *P. brevispira*. In this species the aperture is longer than the spire, as in *Marinula*, but the other characters are decidedly those of *Phytia* (Alexia).

PLANORBIS ISTHMICUS, n. sp.



The shell is compressed, the thickness about one-third of the diameter, thin, very pale brown, somewhat transparent, glossy. Concavity of the right side showing three whorls and a central pit, that of left side shallow, showing 4½ whorls, the last whorl more convex near the sutures, rounded peripherally, not deflected towards the left near the aperture. Sculpture of fine growth-lines, very distinctly decussated by fine spiral lines on the inner whorls, the spirals weak, in part obsolete, on the last whorl. The aperture is oblique, heart-shaped, the lip thin.

Diam. 10.5, alt. 3.7 mm.

Panama City, in Chinese wells. Collected by James Zetek, Sept., 1918.

Planorbis liebmanni Phil., *maya* and *orbiculus* Morel., are flatter shells, with the spire wider. *P. boucardianus* Prest. has a more oblique

aperture, no spiral striation, and is smaller. *P. fieldii* Tryon is a much smaller shell without spiral lines, and higher relative to its diameter.

Probably all of this group should be regarded as toothless forms of *Planorbula.*

GUATEMALAN NOTES.

BY A. A. HINKLEY.

Coelocentrum gigas Von Martens, identified by Dr. H. A. Pilsbry as a dark variety,[1] is the largest land shell the writer ever had the pleasure of hunting. On Feb. 20, 1913, the first dead specimen was found by a large log in a banana field. Probably an hour was spent searching for a live one but without success. Leaving the banana field, I followed up a branch of the Cavech River to where it issued from the mountain side. The labor of working through jungle and over rocks was rewarded by finding the finest specimens of *Pachycheilus indiorum* which I secured. From here the return was around the side of another mountain, heavily wooded; on this mountain 5 living *C. gigas* were found. This was considered a great find.

The next day another place was visited beyond the mouth of the Cavech River to where the mountain came out to the shore of the gulf. After working through the thick undergrowth at the foot of a mountain, the vegetation was more open, making it easier to climb up or down. The first shell found was a fine *C. gigas* in the act of depositing eggs in a round pit about $\frac{3}{4}$ of an inch across, and probably a half-inch deep, scooped out of the mellow earth and containing 35 to 40 eggs.

The best part of the day was spent on this mountain, looking for these shells, of which 19 were secured. They were nearly always partly covered with leaves. No more nests of eggs were found, but others were seen which had been destroyed by some enemy.

[1] The specimens are not "yellowish gray," as von Martens described it, but between walnut brown and burnt umber.

LEPTINARIA LIVINGSTONENSIS, n. sp.

The shell is imperforate, oblong-conic, the length twice the diameter, pale yellow, composed of 6 moderately convex whorls. Apex rather obtuse, surface glossy, coarsely but weakly striate. The sharp outer lip is strongly arched forward at its upper third. Columellar plait strong, dividing the columellar margin into two arcs, the lower one slightly shorter and deeper. Parietal lamella present in the embryos of 1½ whorls. It is quite strongly developed in some shells of 6 mm. long, wanting in others. In older shells it becomes very low, and not quite one-fourth of a whorl long; or in others it disappears entirely.

Length 9.5, diam. 4.7, aperture 4.5 mm. (lamella low).

Length 11, diam. 5, aperture 5 mm. (lamella minute).

Found in rubbish about the city of Livingston, Guatemala, with *Subulina octona*, taken February 19, 1913. This shell is about the same size as *L. tamaulipensis*, but differs from that species by having a parietal lamella and an imperforate umbilical region. The last whorl is less enlarged than in *L. lamellata*, *L. elisæ* or *L. convoluta*, which resemble this species in being imperforate with a lamellate parietal wall.

The small lot taken in 1913 seemed divisible into two species, according to whether a parietal lamella was present or not, but in the abundant series collected on the second trip, it appears that the lamella is variable, being present in many but not all immature shells, but always very low or wanting in the large ones.

SOME NOTES ON PHILOMYCUS.

BY V. STERKI.

In Ohio we had known only *P.* (*Tebennophorus*) *caroliniensis* Bosc. Then a few *dorsalis* Binney were found here and there. Some years ago, near Chippewa Lake, Medina Co., I found two specimens of an entirely distinct species, as listed in the Ohio catalogue; the genitals, etc., remain to be examined. The slug may be the same as *P. pennsylvanicus* Pils., but closer comparison is necessary.

Fifteen and twenty years ago, in this vicinity, I found repeatedly a form which then was taken for one of the color variations of *P. caroliniensis*, although averaging larger, and unfortunately and stupidly I did not examine it exactly. Some time ago one specimen of exactly the same was found, with about a dozen *caroliniensis*, as described by Binney and W. G. Binney. It was evident at first sight that the animal is of a distinct species, and it may be one of those named by Rafinesque, as mentioned in W. G. Binney, Man. Amer. Land Shells, p. 247, but I have not the literature for comparing. In order to have a designation, it may be named *biseriatus*, provisionally the specimen was 70 mm. long when fully extended. The color, over most of the back, is brownish, not grayish, somewhat irregularly mottled, and not sharply defined towards the margins. On the back there are two parallel series of 10–12 irregular black spots, streak-like when the animal is fully extended, the largest in the middle, evanescent towards the anterior and posterior ends. Irregularly distributed, mainly along the outer side of each series are irregular "white" spots; that is, they appear whitish, but the ground color is a pale tan, and there are small dots, rather granules, of a glistening bluish white, and such dots are also distributed over the balance of the mantle surface. On each side, between the series of black apots and the lateral margin, there is another series of slightly marked, cloudy, dark spots, some of them barely visible. The sole is whitish without any color tinge, while in *caroliniensis* it has a rusty tinge from minute dots of that color, especially along the margins. Along the middle, mostly in the posterior part, there is an obscure line of dark, as it is also in *caroliniensis* and some other snails. The head and the posterior end of the foot are somewhat slate-colored, the eye peduncles darker. The whole body is different in appearance from that of *caroliniensis*, and somewhat more translucent.

This description may be imperfect, but I believe that any specimens of the same kind will be readily recognized from it. While the genital organs of two *P. caroliniensis*, of the same size, were fully developed, those of "*biseriatus*" will still quite rudimentary, and nothing could be made out of them. The jaw

was of nearly the same shape in both species, but that of "*biseriatus*" was dark-colored, from horn in the upper part to black at the cutting edge, while the jaw of *caroliniensis* is of a yellowish or reddish horn. The details of the surface must be compared with more material. The radula, with its anterior (older) end torn off, had 141 (+ . . .) rows of 45 + C + 45 teeth of rather the same shape as those of *caroliniensis;* only the mesodonts of the outer laterals (about 13th–25th) seemed larger and longer; one of the *caroliniensis* had 210 rows of 54 + C + 54 teeth.

As Mr. T. D. A. Cockerell suggested, some of the so-called color variations of *P. caroliniensis* may prove to be distinct species. This, and their interrelations, and those of variation, or varieties, should be carefully ascertained and also their distribution. It may be mentioned, in this connection, that *P. wetherbyi* W. G. Binney, originally known from Kentucky, has also been found in northern Michigan, as stated by B. Walker.

Scientifically it may not be justified to publish these rudimentary notes. But there is another reason for doing so. The season is already well advanced. These interesting slugs have been badly neglected, and our knowledge of them is still far from satisfactory. Besides, they are getting more and more scarce in consequence of deforestation of the land, and will disappear in many sections before long, and faster than most other snails. Therefore, every conchologist should pay special attention to anything in this line that can be found. And, to mention it again, by the way, the term "shells" is not the proper one to be used in books and catalogues; we should say mollusks!

With respect to the generic name, I agree with W. G. Binney that the forms and species known should be ranged under one genus, whether their jaws be ribbed or not, if there are no other more significant differences. The jaw of the Chippewa slug seems to be really intermediate between the "smooth" and ribbed forms. W. G. Binney rejects the name *Philomycus*, because Rafinesque did not correctly describe this genus under that name. There is hardly a conchologist who doubts now but that Rafinesque really understood the slugs under consider-

ation. In comparing them with *Limax* and *Arion*, he did not find the mantle shield much shorter than the body, and plainly evident, like the one of those slugs, and came to the conclusion that there was none at all; conceded that it was one of the careless things he was in the habit of doing. Also, if *Philomycus* was not the same thing as *Tebennophorus*, etc., the family name Philomycidæ, in the sense as used, has no claim for recognition.

THE SHELL OF PHILOMYCUS CAROLINIANUS (BOSC).

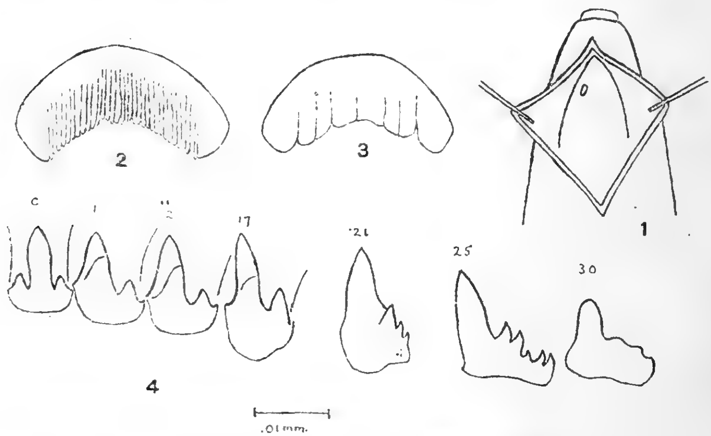
BY WILLIAM F. CLAPP.

Through the kindness of Mr. J. Henry Blake I recently received a specimen of *Philomycus carolinianus* (Bosc.), from Munsonville, N. H., to examine for internal parasites. On laying open the mantle preparatory to removing the stomach and intestine, I discovered a rudimentary shell. When first noticed, it was not attached, either to the mantle or to the inner membrane which covers the viscera, but was floating free in the liquid in which the dissection was made. From its position I believed it to have been dislodged from some portion of the posterior fourth of the animal, between the mantle and the inner membrane. Losing immediately all interest in possible internal parasites, I gave my attention entirely to the problem of the shell, in an endeavour to ascertain its exact position, and also to discover whether it is to be considered a constant, or merely an occasional character in this species.

From Dr. R. C. Rush, of Hudson, Ohio, I received fifty specimens (M. C. Z. 48211) of living *Philomycus* in excellent condition. The specimens in this lot show slight variation in color, the majority being of the typical pattern, of a yellowish-white ground color, variegated with brownish and blackish clouds and spots, forming three ill-defined longitudinal bands, one on the center of the back, and one on each flank. There are, however, three specimens easily separated from the rest because of the reddish tinge in the brownish clouds and spots. In these specimens (M. C. Z. 48211 H) the lateral bands are

lacking entirely, there being one broad dorsal band of darker reddish brown, bounded on each side by a narrow row of more or less connected black spots.

In the eighteen specimens of this lot examined, all possessed a rudimentary shell. In many cases, in spite of the greatest care in making the incision in the mantle, the shell had become dislodged from its normal position. In eight specimens it remained attached to the animal when found. In all of these specimens it was adherent to the outer surface of the inner membrane or peritoneum, and not connected in any way to the inner surface of the mantle. It also, in the specimens in which it remained fastened, was always in the posterior quarter of the animal, and over some portion of the liver. In two of the eight specimens it occurred on the left side, in two directly on top, and in four on the right side of the liver. The diagram (fig. 1) was made from a specimen (M. C. Z. 48211 H) measuring 40 mm. in length in a considerably contracted condition. On opening the mantle, the position of the shell was found to be 5 mm. from the posterior extremity of the animal and on



Figs. 1, 2, 3, *Philomycus carolinianus* (Bosc), Hudson, Ohio.
Fig. 4, *P. rushi*, n. sp.

the right side. It is of a light horn color, transparent, very iridescent, thin, delicate, wrinkled. It measures .5 mm. in length and .25 mm. in width. In appearance it greatly re-

sembles the periostracum of the shell of a *Limax maximus* which remains when the shell has been decalcified in weak acid.

In some of the shells extracted from specimens from Hudson, Ohio, a portion of the delicate membrane contains a few granules of what appear to be calcareous crystals. In outline the rudimentary shell is irregular, the membrane becoming very thin, delicate and transparent at the edge. In some specimens it was folded on itself, but the general tendency is for it to be oblong rather than oval, and in outline, not unlike the shell of *Limax maximus*. Specimens from the following localities were examined, in all but one of which the rudimentary shell was found.

Spec's.	*M. C. Z. No.*	*Locality.*	*Received from.*
1	18540	Isle au Haute, Me.	M. C. Z.
1	48207	Munsonville, N. H.	J. Henry Blake.
1	48217	Mt. Monadnock, N.H.	Dr. W. H. Dall.
2	42145	Duxbury, Mass.	M. C. Z. (shell not found in one).
1	48212	Tannersville, N. Y.	Dr. H. A. Pilsbry.
18	48211	Hudson, Ohio.	Dr. R. C. Rush.
2	48214	York Furnace, Pa.	Dr. H. A. Pilsbry.
2	48213	York Co., Pa.	Dr. H. A. Pilsbry.
4	48215	Wyoming Co., Pa.	Dr. H. A. Pilsbry.

This species was originally described as *Limax carolinianus* (Bosc, Hist. Nat. des Vers, suites à Buffon, ed Deterville, 1, p. 80, pl. 3, f. 1, 1802. Rafinesque (Annals of Nature, p. 10, 1820) gave the name of *Philomycus* to species which differed from *Limax*, principally, in being entirely destitute of a mantle. Rafinesque, however, made no mention of *Limax carolinianus* in this paper and it remained for Ferussac (Tab. Syst., p. 15, 1821) to place the species, which he spells *caroliniensis*, in Rafinesque's genus *Philomycus*. Binney (Bost. Journ. Nat. Hist., 4, p. 163, 1842), recognizing the fact that *carolinianus* Bosc. possessed a mantle covering the entire upper surface of the animal, removed the species from Rafinesque's genus *Philomycus*, where Ferussac had placed it, and made it the type of a new genus,

Tebennophorus, signifying "wearing a cloak". In diagnosing the genus, Binney states that it is "without testaceous rudiment". Wyman (Bost. Journ. Nat. Hist., 4, p. 411, 1844) and Leidy (Terr. Moll. U. S., 1, p. 250, pl. 3, 1851) in describing the anatomy of *Tebennophorus*, did not mention finding a rudimentary shell. W. G. Binney (Terr. Moll. U. S., 5, p. 179, 1878) specifies that *Tebennophorus* has no external or internal shell, and adds (p. 180) that "the internal, rudimentary, nail like shell, described by Dr. Gray, has not been noticed by any American author". Dr. Gray's description (Cat. Pulmon. Brit. Mus., part 1, p. 158, 1855) of the genus *Philomycus*, includes the statement, "Shell minute, nail like, concealed in the front part of the mantle". Yet (p. 155) in describing the tribe *Philomycina*, in which he places the genus *Philomycus*, he states, "Shell none". From Dr. Gray's description of the shell as being "nail-like", and "concealed in the front part of the mantle", I doubt that he had the shell of *Philomycus carolinianus.*

An examination of the jaw and radula of each of the specimens in which a shell was found, disclosed the fact that the jaw varies considerably in specimens apparently otherwise identical. In the fifteen specimens from Hudson, Ohio (M. C. Z. 48211), which I consider typical *carolinianus* (Bosc), as described by Binney, thirteen possessed a smooth jaw, with very faint longitudinal and transverse striae showing only when highly magnified. The remaining two were strongly plaited (figs. 2, 3). Of the three specimens (M. C. Z. 48211 H) separated from the others because of the reddish tinge of the mantle, the jaw of one was similar to fig. 2, the others were smooth. This plaiting of the jaw, although it may be felt with a fine needle, is not to be confused with the ribbing of the jaw as seen in *Pallifera dorsalis* Binney (Morse, Journ. Port. Soc. Nat. Hist., 1, p. 8, f. 5, 1864). That portion of the mouth which carries the jaw in *Philomycus carolinianus*, is always deeply furrowed, and it appears that these furrows may, or may not leave their impression upon the jaw. It is possible that the presence or absence of plaiting in the jaw may be entirely a question of age. In all of the specimens examined none of the other char-

acters showed noteworthy variation, and I have considered them all *P. carolinianus.*

It is worthy of record that the specimens which were sent to me in such excellent condition by Dr. R. C. Rush, were shipped in a small wooden box filled with damp, absolutely clean moss. Every specimen was alive. The slightest amount of dirt or dust in the material in which the specimens are packed is fatal. From one of Dr. Rush's letters I take the liberty of quoting some interesting notes regarding the habits of the species.

"It is very easy to collect specimens of this species, but very difficult to send them any considerable distance and have them live. If kept too moist they suffocate, and if allowed too much air they dry up. I have had five-inch specimens die in twenty minutes in strong sunlight. To keep specimens alive, place them on the under side of an old piece of bark on the basement floor, making certain that they are absolutely in the dark. Feed them with any fungi and they will live for months. Curiously the large specimens of this species are not found in damp places in northern Ohio. They are found here in high, dry, hard-maple and beech forests, on stumps and logs which have not decayed much, in pockets under the bark. They feed at night and go back to the same nest every morning. Very rarely one will find them feeding on the under side of fungi in daylight. It will interest you to know that nine of the specimens I am sending came from a crack in a log, seven inches long by two inches wide, and I left seven behind. They were packed in like sardines."

Philomycus rushi, sp. nov.

In alcohol, mantle smooth, drab gray above (Ridgway, Color Standards and Nomenclature, pl. 46, 1912), lighter on the sides, eye peduncles dark gray, eye spots black, tentacles, situated beneath and very slightly outside the eye peduncles, short, gray. Body terminating posteriorly in a sharp point. Foot narrow, half the width of the body, cream-white below, excepting at the anterior end, where it is dark red, fading at the posterior end. The separation of the foot from the body well defined. The body, showing at the sides between the foot

and the mantle, only as a narrow ridge at the posterior end, but broadening at the anterior, is also stained with red, darker at the anterior end. Respiratory orifice, small, on the right side, 2.5 mm. behind the anterior edge of the mantle, in the center of the narrow mantle furrow which curves upward and backward from the mantle edge. Total length 15 mm., width 3 mm.

Internal rudimentary shell large, similar to that of *P. carolinianus* (Bosc), 6 mm. from the posterior extremity, and fastened to that portion of the peritoneum directly above the ovotestis. Approximately 2 mm. in diameter.

The jaw is similar to that of *P. carolinianus* in shape, and in being but very slightly plicate.

The radula, fig. 4, consists of about 150 rows of teeth having a formula of 38-1-38.

The one specimen received in sufficiently good condition to examine the internal organs, was infested with two stages of parasitic Trematoda. Twenty of these were found in the vicinity of the lung, one beneath the shell, and one in the penis near the retractor muscle. Therefore the reproductive organs in this specimen may be in an abnormal condition, and on this account I refrain from figuring them. One of the most noticeable differences is the complete absence of any glandular portion to the cloaca, a large and constant character in *P. carolinianus*. The ovotestis is nearly black, in sharp contrast to the light-colored liver and other organs in the posterior portion of the animal.

Type M. C. Z. 48220. Hudson, Ohio, collected by Dr. R. C. Rush.

I have connected Dr. Rush's name with this species as a slight recognition of the care and perseverance he has exercised for many years in studying the life history of the land shells of Ohio.

Dr. Sterki (Proc. Ohio State Acad. Sci., 4, p. 377) describes a closely related species as "*Philomycus* sp. *pennsylvanicus* Pils.?" Dr. Sterki's species is similar to *P. rushi* in that it possesses a "sole tinged with blood red" but differs in being twice as large (30 mm. long), and in the jaw having "a num-

ber of rib-like irregular ridges". *P. pennsylvanicus* Pils. (Proc. Acad. Nat. Sci. Phil., p. 22, 1894) is described as being "smaller and less distinctly marked than *P. carolinensis*" and "having the jaw strongly ribbed", a description which could not be applied to *P. rushi*.

CLIMATIC CONDITIONS AS INDICATED BY LAND SHELLS ON THE ISLAND OF OAHU.

BY J. J. GOUVEIA.[1]

Since the early part of 1913 the writer and his brother A. Gouveia have been engaged in making a collection of Hawaiian land shells, both ground and tree. We have accumulated specimens of shells from nearly all valleys and ridges on the island of Oahu. We have complete data as to the exact locality and habits, so it can be seen that the writer has a good proof, from his series, of Gulick's theories of segregation or isolation. This idea has been written and followed out by many other collectors and students until it is well known in the scientific world. One of the best examples of this is seen in Dr. Cooke's paper on *Achatinella multizona*.

Distribution of *Achatinella cestus* from Manoa-Palolo Ridge to Wailupe-Niu Ridge.—*Achatinella cestus* (Newcomb) is found mostly on lehua or one of its related plants having a rather large dark green and glossy leaf, on Ieie, Opiko and Lantana, and nearly always under leaves, with the exception of the Wailupe-Niu locality where they are found mostly on Lantana stems. They are nearly always found sealed. The only time they are found extended is when they are disturbed by wind or rain or accidentally brushed off, so they must be nocturnal as Dr. Cooke surmises (1).

They are very variable in color from white to very dark brown. They are lighter on the western part of the range and become darker towards the eastern part. The greater part of these shells have a white border band (2).

[1] Contribution from the Gulick Natural History Club.

The writer has specimens from five different localities. Four of these localities are on ridges and the other in a valley. First locality, Manoa-Palolo Ridge: Fossil specimens in collection as catalogued, Cat. No. 487, four sinistral and No. 492 three sinistral, making a total of seven sinistral specimens.

Second locality, Palolo-Waialae Nui ridge: Fossil and living specimens, Catalogue No. 61 nine dextral, No. 382 two dextral and two dextral fossil specimens not catalogued. Total, eleven dextral live specimens and two dextral fossil specimens.

Third locality, Waialae-Nui valley: Catalogue No. 38 seven dextral specimens, No. 383 one dextral specimen, No. 39 seven dextral specimens. Total, fifteen dextral specimens.

Fourth locality, Waialae Iki-Wailupe ridge: Catalogue No. 28, fifty-two sinistral specimens.

Fifth locality, Wailupe-Niu ridge: Catalogue No. 14, two hundred and twenty-two sinistral specimens.

Summary.

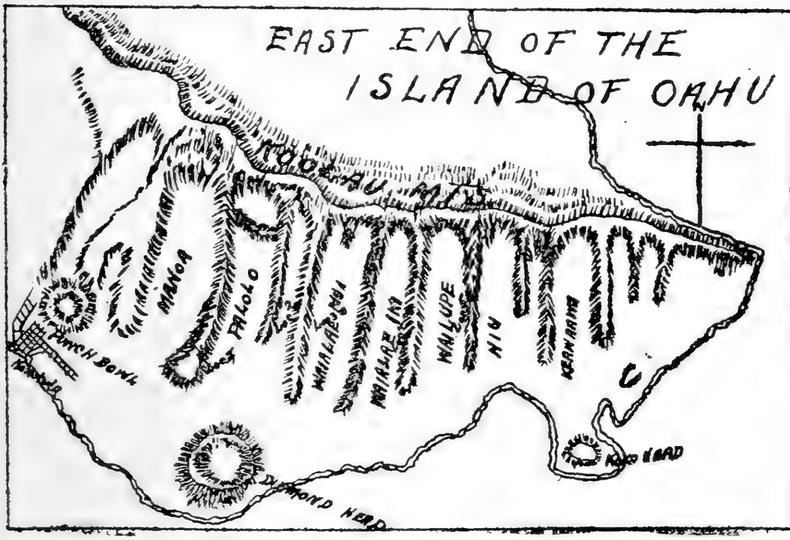
	Fossil.		Live.	
	Dextral.	Sinistral.	Dextral.	Sinistral.
1st locality . .	—	7	—	
2nd " . .	2	—	11	—
3rd " . .	—	—	15	—
4th " . .	—	—	52	—
5th " . .	—	—	—	222
Totals. . .	2	7	78	222

Thus it can be seen from the above given data the specimens increase in number from west to east, the first ridge having no live specimens and the last having the most. What does this signify? Does not this signify that since Diamond Head and Punchbowl came into eruption, climatic conditions have changed which resulted in the elimination of *cestus* from the neighborhood of the two now extinct volcanoes?

Now, in relation to the fossils found on location one, this is the nearest locality to Diamond Head; the second locality a little further away; the third still further; and the fourth and

fifth, the furthest of all, say about seven miles comparing with about two and one-half miles, locality one.

The fossils were found lower than the live specimens on the ridges, and as we go east the live specimens are found higher up on the ridges or further away from the lower limits as indicated by the fossils.



In 1916 while the Honolulu Water Works were digging a ditch for a pipe line, fossils of *Achatinella montaguei* and *buddi* were found by A. Gouveia buried about four feet deep in Manoa valley near Manoa tennis court. The *montaguei* is now extinct and the *buddi* nearly so in other localities. They are however extinct in the above given locality. These shells thrived very low once, and owing to the climatic changes the forest has disappeared, thus explaining the present distribution.

The strongest evidence yet is indicated by fossil ground shells, catalogue numbers 932 to 942 inclusive, *Leptachatina oryza* and a few other unnamed varieties which were collected on the western slope of Diamond Head, also catalogue Nos. 859 to 869 inclusive. *Amastra transversalis* also *Endodonta* and *Leptachatina*, Nos. 972 to 975 inclusive, collected on the town side of

Punchbowl. These shells are frequent in occurrence and now extinct. Dr. C. H. Hitchcock gives a very good account of the geological occurrence or position of these shells on Diamond Head and Punchbowl (3).

We have also collected *Amastra* fossils from Kahuku, Mokuleia and Kwaihapai.

The cause of recent disappearance is the destruction of the forest, collecting by people, and ravages of cattle and goats. An example of this is found on Olomana where Dr. Gulick collected in or about 1850. In the fifties this peak was covered with forest which has disappeared. *Achatinella phæozona* was found on Olomana where it is not now found owing to the disappearance of the forest.

Papers referred to.

1. Cooke, C. Montague.—Distribution and Variation of *Achatinella multizonata* from Nuuanu Valley. Occasional Papers, Bernice Pauahi Bishop Museum, Vol. II, No. 1–5, pp. 65–76.

2. Thwing, E. W.—Occasional Papers of the Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History, Vol. III, No. 1, 1907, pp. 13. Original Descriptions of *Achatinella.*

3. Hitchcock, C. H., and Dall, W. H.—Geology of Oahu, Bulletin of the Geological Society of America, Vol. II, pp. 15 to 60, February, 1900. Notes of Fossil Land Shells on pp. 54–55.

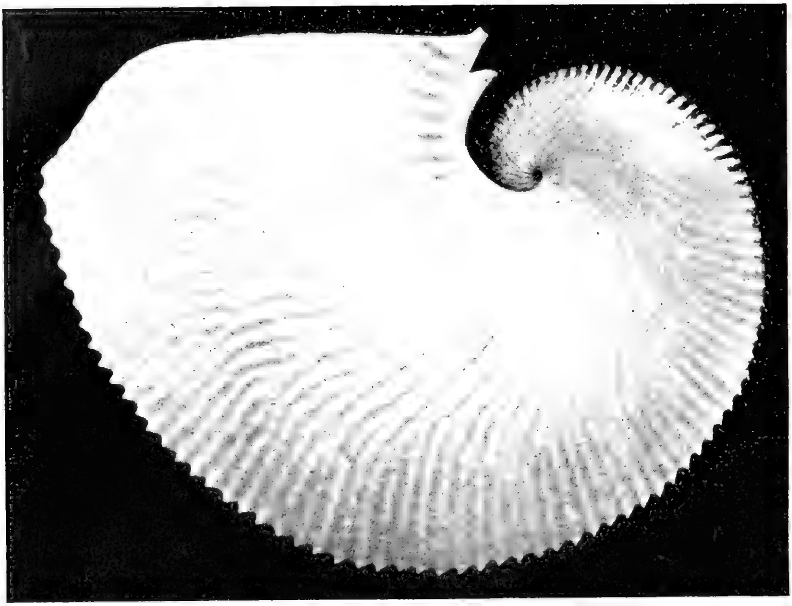
A NEW CYPRAEA FROM HAWAII.

BY J. M. OSTERGAARD.[1]

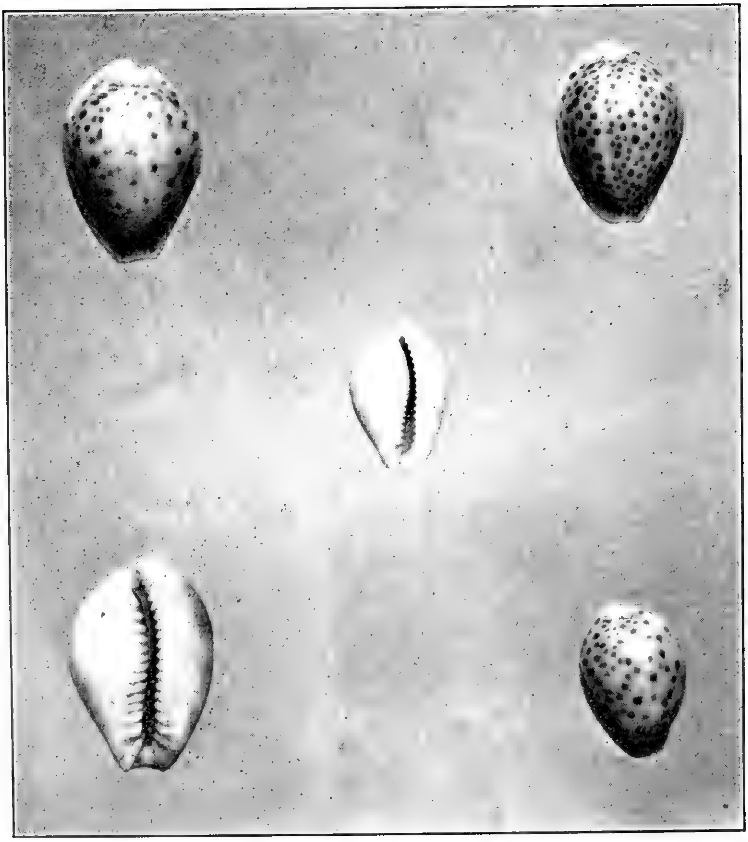
CYPRAEA PACIFICA, n. sp. Plate 2, lower five figs.

Whitish to cream color, richly ornamented with chestnut-brown spots, evenly sprinkled over the dorsal surface; base, aperture and teeth, white; resembles *C. cernica* Sowb. in form, having in common with that species elevated and pitted mar-

[1] Contribution from the Gulick Nat. Hist. Club.



THE LARGE ARGONAUTA COMPRESSA



CYPRAEA PACIFICA OSTERGAARD

gins, though less pronounced; teeth small and delicately cut, not confined to aperture, all extending evenly over a narrow zone of the base.

The largest and the smallest of five specimens, dredged from Honolulu harbor channel in 1915, measure in length 20 and 14 mm. respectively. The shells were all dead, but in a good state of preservation.

Type, one specimen in the author's collection.

REVIEW OF THE THYSANOPHORA PLAGIOPTYCHA GROUP.

BY H. A. PILSBRY.

In the course of identifying specimens of this group from Mexico and Panama it became necessary to examine all of the material in the collection of the Academy, some 46 lots of from one to several hundred specimens each. As some synonymy is involved, it may be well to put the results on record.

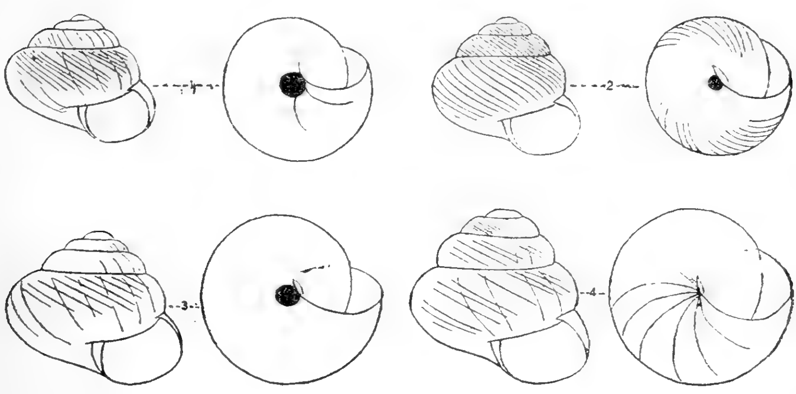


Fig. 1. *Thysanophora fuscula* (C. B. Ad.), Jamaica. Fig. 2, *T. plagioptycha* (Shuttl.), Humacao, Porto Rico. Fig. 3, *T. plagioptycha*, Fikahatchee Key, Florida. Fig. 4, *T. cæcoides* (Tate), Panama City.

These forms were considered to belong to the genus *Acanthinula* by Strebel and some other authors. The sculpture, however, is only superficially like that genus, but exactly like such

typical Thysanophoras as *T. conspurcatella* and *hornii.* There are also species intermediate in shape, such as *T. fuscula* and *T. intonsa,* leading from the depressed to the conic forms. It would be easy to tell absolutely where these snails belong if specimens containing the animal were available.

Though not strictly germane to the subject of this paper, it may be mentioned that *Trichodiscina crinita* Fulton, Proc. Malac. Soc., London, XII, 240, from Colombia, is a species of *Thysanophora.* Some allied forms are known from Venezuela as well as from Mexico. It has about the shape of *T. conspurcatella* or *hornii.* The latter, when perfectly preserved, also has hairs.

THYSANOPHORA FUSCULA (C. B. Adams). Fig. 1.

Helix fuscula C. B. Ad., Contrib. to Conch. no. 2, 1849, p. 35.
Thysanophora fischeri Pilsbry, Proc. A. N. S. Phila. 1903, p. 763, pl. 49, fig. 6, 6*a*.

This Jamaican species has a wider umbilicus than others of the group, contained about 6.4 times in the diameter of shell. The figures are from a specimen from Adams, measuring: Alt. 2.15, diam. 2.55 mm., umbilicus 0.4 mm.

The sculpture of rather coarse growth wrinkles and minute, oblique, retractive cuticular threads, does not differ materially from that of *T. plagioptycha.*

I can see no material difference between the Jamaican shells and those taken near Victoria, Tamaulipas by S. N. Rhoads, and in the region of Tampico by A. A. Hinkley, and which I described as *T. fischeri.* In these the umbilicus is contained about 7 times in the diameter. When describing this form I did not think to compare with the Jamaican snail. Like some other minute species of the region, it will probably be found to be more widely spread than now known.

THYSANOPHORA PLAGIOPTYCHA (Shuttleworth). Fig. 2.

Helix plagioptycha Shuttl., Mittheil. der Naturforschenden Gesellschaft in Bern, 1854, p. 37 (Porto Rico and Vièque).
Helix ierensis Guppy, Proc. Scient. Asso. Trinidad, 1869, p. 242; Amer. Journ. of Conch. VI, 1871, p. 307, pl. 17, fig. 4. Pfeiffer, Mon. Hel. Viv. VII, p. 549.

A specimen from Humacao, Porto Rico, which may be taken as type locality, is figured. It scarcely shows growth striae, but the oblique cuticular threads are very well developed, extending upon the base. The umbilicus is contained between 10 and 11 times in the diameter. Alt. 2.25, diam. 2.5 mm., umbilicus 0.23 mm.; 4½ whorls.

The specimens from Florida (fig. 3, Fikahatchee Key) are often larger, diam. 3 to 3.2 mm., with the umbilicus slightly larger, 7½ to 8 times in the diameter. The sculpture is rarely so perfectly developed (or preserved) as in the Porto Rico shells. It is a common species on the keys and in some places on the mainland, as at Miami and Osprey.

A single small example from Brownsville, Texas, has the umbilicus remarkably small, contained about 14 times in the diameter. It is more depressed than *T. cæcoides*. It may represent a distinct race, but further material is needed.

Guppy has recorded the species (as *Helix ierensis*) from Trinidad. Specimens are at hand from St. Lucia (Tate), Cariaco, Venezuela (F. R. Cocking) and the U. S. of Colombia (R. Swift coll.). All of these are rather openly umbilicate, like the most widely umbilicate Florida shells, but not as open as *T. fuscula*.

The late Mr. E. A. Smith, in his excellent paper on Trinidad shells (Journ. of Conch. VIII, p. 239), considered *plagioptycha* and *ierensis* synonyms of *fuscula* Ad., but while the difference is not great, I have been unable to trace a real transition in the size of the umbilicus, and for the present it seems best to recognize the distinction. I have seen but three Jamaican specimens, however.

THYSANOPHORA CÆCOIDES (Tate). Fig. 4.

Helix cæcoides Tate, Amer. Journ. of Conch. V, p. 153, Feb., 1870.

Helix guatemalensis Crosse et Fischer, Journ. de Conchyl. XX, p. 222, 1872; XXI, p. 274, pl. 9, fig. 3, 1873; Miss. Sci. Mex., Moll., II, p. 664, pl. 71, figs. 9–9*b* (Guatemala, Sarg.).

Acanthinula granum Strebel, Beitrag Mex. IV, 1880, p. 31, pl. 4, f. 13 (Plantage Mirador).

Yucatan: Progreso (Heilprin Exped. 1890). Guatemala:

Quirigua (W. P. Cockerell, 1912). Nicaragua: Chontales forest, in moss on trees (Tate, type of *H. cæcoides*). Rep. de Panama: Boco del Toro (Tate, in A. N. S. P.); City of Panama (James Zetek).

This species differs very little from *T. plagioptycha* or *fuscula* in size, general shape and sculpture, but is readily distinguished by the very small, partly covered umbilical perforation. The umbilicus, while small, is much larger in the other species.

Part of the type lot of *T. cæcoides* is in the collection of the Academy, No. 12159, received from Prof. Tate. The original figures of *H. guatemalensis* are hardly recognizable, but those in the Mexican monograph are fairly good. I am not quite sure that the East Mexican *Acanthinula granum* Strebel (1880) belongs to this species, but the photographic figure shows only a very small umbilicus as in *cæcoides*. This may be taken up when topotypes are available.

The locality records are all for specimens in the collection of the Academy. Specimens from Costa Rica are still wanting.

LAND SHELLS OF MAINE.

BY E. G. VANATTA.

While botanizing in Maine in 1916 Mr. Bayard Long collected leaf mould containing land shells at numerous localities. A list of these stations with brief statement of the conditions and the dates is given below, the locality being condensed to a single word in the following list of species.

While most of the species have been known from Maine, it is hoped that the list will have interest to those who may study the details of distribution in the State.

York Co.—In moist woods bordering the salt marsh at Kittery, viii, 11; in moist woods at York, viii, 9; at the edge of a spring rill on the border of the salt marsh at Wells, viii, 8; in moist thickets along a small stream at Limington, viii, 29.

Cumberland Co.—In a moist wooded gulley near Steep Falls in Baldwin, viii, 28; around Sand Pond, Baldwin, viii, 30; Douglas Hill in Sebago, viii, 30.

Sagadahoc Co.—Back River Creek, Woolwich, ix, 15; near a marsh at Bowdoinham, ix, 9 and ix, 14.

Hancock Co.—In a deciduous woods near Green Pond, viii, 18.

Kennebec Co.—On wooded terraces along Kennebec River at Sidney, viii, 18.

Somerset Co.—On wooded terraces along Kennebec River at Fairfield, vii, 24.

Piscataquis Co.—Under logs and boards along the Piscataquis River at Abbott, viii, 15.

Penobscot Co.—On the wooded gravel terrace along Souadabscook Stream at Hampden, ix, 8 and ix, 11; from the wooded rocky ledge along the Penobscot River near Hampden Corner in Hampden, ix, 8; near the Penobscot River at Veazie, viii, 4; Orono, viii, 3 and viii, 24; in alluvial woods along the Penobscot River at Old Town, vii, 27; Otter Chain Pond at Milford, viii, 25; in moist river shore thickets at Winn, viii, 10.

Aroostook Co.—In rich woods near Maduxnekeag River at Monticello, vii, 12; in rich woods at Houlton, viii, 13, 1916.

Polygyra fraterna cava P. & V. Sebago, Sidney, Fairfield, Hampden, and Hampden Corner.

Strobilops labyrinthica Say. Kittery, Green Pond, Sidney, Fairfield, Abbott, Hampden, Winn, and Monticello.

Strobilops affinis Pils. Sebago.

Gastrocopta pentodon Say. Sidney, Abbott, Hampden Corner, and Winn.

Gastrocopta pentodon tappaniana Ad. Old Town.

Vertigo ventricosa Morse. Kittery, Green Pond, Fairfield, Orono, and Winn.

Vallonia excentrica St. Kittery and Orono.

Acanthinula harpa Say. Fairfield.

Columella edentula Drap. Sidney and Monticello.

Cochlicopa lubrica Müll. Bowdoinham, Sidney, Abbott, Fairfield, Hampden, Hampden Corner, and Orono.

Circinaria concava Say. Bowdoinham, Sidney, and Fairfield.

Vitrina limpida Gld. Kittery, Old Town, and Winn.

Polita hammonis Strom. York, Limington, Bowdoinham, Green Pond, Sidney, Fairfield, Abbott, Hampden, Orono, Old Town, Winn, and Monticello.

Polita binneyana Morse. Sebago, Sidney, Abbott, and Hampden.

Polita indentata Say. York, Green Pond, and Fairfield.

Paravitrea lamellidens Pils. Green Pond, Sidney, and Abbott.

Euconulus chersinus Say. Abbott.

Euconulus fulvus Müll. Sebago, Bowdoinham, Hampden Corner, and Winn.

Zonitoides arborea Say. Kittery, Sebago, Bowdoinham, Green Pond, Sidney, Fairfield, Abbott, Hampden Corner, Orono, and Monticello.

Zonitoides minuscula Binn. Sidney.

Striatura ferrea Mrse. York, Steep Falls, Green Pond, Sidney, and Houlton.

Striatura exigua Stm. Steep Falls, Sebago, Green Pond, Fairfield, Abbott, Old Town, Winn, Milford, and Monticello.

Striatura milium Mrse. York, Baldwin, Green Pond, Sidney, Abbott, Hampden, Old Town, and Winn.

Agriolimax campestris Binn. Orono.

Agriolimax agrestis L. Orono.

Arion circumscriptus Jhn. Orono.

Pyramidula alternata Say. Sidney, Fairfield, Hampden, and Hampden Corners.

Pyramidula c. anthonyi Pils. Kittery, Sidney, Fairfield, Abbott, Hampden, Orono, and Winn.

Pyramidula c. catskillensis Pils. York, Limington, Sebago, Fairfield, Abbott, Hampden Corner, Winn, and Monticello.

Pyramidula (Planogyra) asteriscus Mrse. Winn.

Helicodiscus parallelus Say. York, Steep Falls, Green Pond, Sidney, Abbott, Fairfield, Hampden Corner, Orono, Old Town, Milford, and Monticello.

Punctum pygmaeum Drap. York, Green Pond, Sidney, Fairfield, Abbott, Hampden Corner, and Winn.

Succinea retusa Lea. Bowdoinham and Fairfield.

Succinea ovalis Say. Kittery, Limington, Woolwich, Bowdoinham, Sidney, Fairfield, Abbott, Hampden, Hampden Corner, Veazie, Orono, Old Town, Milford, Winn, and Monticello.

Succinea avara Say. Limington, Bowdoinham, and Veazie.

Succinea aurea Lea. Wells.

Carychium exile canadense Cl. Sidney, Fairfield, Abbott, and Monticello.

Carychium exiguum Say. Bowdoinham, Old Town, and Winn.

ANCYLUS OBSCURUS HALDEMAN AND SPECIES REFERRED TO IT.

BY BRYANT WALKER.

I.

The available information down to 1903 in regard to Haldeman's species was summarized in my paper in the NAUTILUS, XVII, p. 25. The re-discovery of *A. obscurus* by Goodrich in 1913 (NAUT., XXVII, p. 92) in the South Fork of the Powell River at Big Stone Gap, Wise Co., Va., has enabled the specific standing of that species to be definitely determined and given a basis for comparison with other forms that have been referred to it.

Through the courtesy of Miss Crystal Thompson, the Curator of the Amherst College Museum, I have been able to examine all of the *Ancylidæ* in the C. B. Adams collection. This material with some other in my own collection obtained from different sources has enabled me to come to conclusions, more or less definite, in regard to the recorded citations of Haldeman's species in Florida and the West Indias.

The doubt expressed by Bourguignat, Tryon and Clessin as to the correctness of the West-Indian citations proves to be fully justified.

In the Adams collection are two lots labeled "*A. obscurus?* Hald." These contain three very distinct species, none of which is *obscurus.* They will be considered separately.

One of these, however, is identical with a set in my own collection received as "*A. obscurus*" from Sowerby and Fulton and these again are the same as a set in the MacAndrew collection labeled "*A. chittyi* Ads." from Guadeloupe. The original

label is with these specimens, but I have not been able to identify the handwriting. It is quite possible that they came from Marie as MacAndrew had considerable material from the Marie collection. These shells do not at all agree with Adams' description of *chittyi* nor with the figure of that species given by Bourguignat in the J. de Con., IV, 1853, p. 172, pl. VI, fig. 10. Unfortunately Bourguignat does not state whether his figure was drawn from the unique type in the Chitty collection or not. It seems possible that the citation of *obscurus* from Guadeloupe by Fischer in 1853, which Mazé in 1883 states had not been verified to his knowledge, may have been based on similar specimens. Curiously enough, however, I haye a specimen of this same species received from Geret of Paris as from the Crosse collection, which has no specific name attached whatever.

The citation of *A. obscurus* from St. Thomas rests entirely upon Shuttleworth's citation in his "Catalogue of the Terrestrial and Fluviatile Shells of St. Thomas" (Ann. Lyc. Nat. Hist., N. Y., VI, 1854, p. 72) and repeated in his paper on "The Land and Fresh-water Shells of Porto Rico" (Diag. Neuer Moll., No. 6, 1854, p. 99). Shuttleworth expressly states that he relied on Adams' identification for the name. In the Adams collection is an unidentified set of a small *Ancylus* from St. Thomas received from Bland and, no doubt, collected by him on his visit to that island in 1852, which is entirely different from Haldeman's species. Bland in his notes to Shuttleworth's paper (1. c. p. 68) states that he had sent to Shuttleworth specimens of all the species that he had collected on St. Thomas and, though it is possible that Shuttleworth's specimens were received from his own collector, Blauner, it is probable, especially as he relied on Adams' identification, that were received from Bland and, if so, were, no doubt, part of the same lot in the Adams collection.

As suspected at the time and intimated in my paper (1. c. 26) the Floridan species referred to *obscurus* by Dall is quite different also.

I have not been able to obtain any additional information in regard to the species from Porto Rico referred to *obscurus* by

Shuttleworth (l. c. p. 98). But it is very improbable that it is really Haldeman's species.

All this leads to the very definite conclusion that *A. obscurus* Hald. is restricted to the head-waters of the Tennessee system in Virginia and Tennessee and does not occur in Florida or the West Indies.

Clessin (Con. Cab., Ancylus, p. 14) designated *A. obscurus* as the type of his group, *Haldemania.* As both the genuine *obscurus* and the species that he took for it are *Lævapices* it is immaterial which should be considered to be his type. *Haldemania* having been preoccupied by Tryon (1862), Clessin's name can not be used and must fall into the synonymy of *Lævapex.*

II.

FERRISSIA (LÆVAPEX) OBSCURA (Hald.).*

Ancylus obscurus Haldeman, Mon., 1844, p. 9, pl. I, fig. 5; W. G. Binney, L. and F.-W. Shells, Pt. II, 1865, p. 139, fig. 232.

Haldeman's unique type came from the Nolachucky River, below Greeneville, Tenn. It measured: Length 5, width 3.5, alt. 1.5 mm. I have before me three specimens (Coll. Walker, No. 36292) collected by Goodrich in the South Fork of the Powell River at Big Stone Gap, Wise Co., Va. They measure respectively: Length 6.5, width 5, alt. 2.5 mm.; length 6.3, width 4.5, alt. 2 mm.; length 5.3, width 4, alt. 1.5 mm.

It will be noticed that the dimensions of the smallest specimen agree quite exactly with those of Haldeman's type. It also agrees in other particulars with his description and I have no doubt but that it is the same species. If so, the type was not fully matured and the largest specimen given above and to be figured hereafter represents the fully matured form. As shown by the figures it is an obovate shell, broadly rounded anteriorly and regularly, though more narrowly, rounded posteriorly, the lateral margins being about equally curved; the

* The species will be figured in connection with the concluding part of this paper.

anterior slope is nearly straight; the posterior slope slightly concave; the left lateral slope nearly straight or only slightly convex and the right lateral slope concave; the apex is obtuse, smooth except for concentric wrinkles, situated nearly on the median line, slightly turned toward the right and at about one-third of the length; the lines of growth are fine, but distinct and regular, the surface is somewhat obsoletely wrinkled towards the margins, but there are no indications of radial striæ; the color is a yellowish horn-color, slightly tinged with green.

Compared with *F. diaphana* (Hald.) and *F. kirklandi* (Walk.) to which it is most nearly related, it is less circular in outline, the apex is more prominent, the lateral and posterior slopes are unlike and the color is different from the former, and it is less elongated and has the apex more obtuse and less excentric than the latter.

So far as appears from the small series examined, it would seem to be clearly entitled to specific distinction.

III.

Ferrissia (Lævapex) dalli, n. sp.

? *Ancylus obscurus* Clessin, Con. Cab., Ancylus, 1882, p. 19, pl. VI, fig. 4.

Ancycus obscurus? Walker, Naut., XIII, 1903, p. 26, pl. I, figs. 16–18.

Type locality, Lake Helena, Volusia Co., Fla.

Type No. 25521 Coll. Walker. Cotypes in the collection of A. A. Hinkley.

The doubt expressed in my paper of 1903 (l. c.) as to the identity of the Floridan species referred to *obscurus* Hald. by Dall proves to have been well taken. As shown by a comparison of the description and figures given in 1903 as cited above and those of the genuine *obscurus* herein, the Floridan species is entirely different and is more closely related to *F. peninsulæ* (P. and J.) than it is to *obscurus*.

I have already (l. c.) called attention to the resemblance of the shell described and figured by Clessin as *A. obscurus* to this form. He gives no information as to the history of the speci-

men figured, but it is so different from the genuine *obscurus*, that I have but little hesitancy in referring it to this species.

As the Floridan form is a well-marked and distinct species, it must be recognized and I take pleasure in associating with it the name of Dr. Dall, who first called attention to its occurrence in Florida.

(*To be continued.*)

A NEW SPECIES OF MITRA FROM CALIFORNIA.

BY WM. HEALEY DALL.

MITRA ORCUTTI, new species.

Shell small, white, mottled with yellow brown, with five whorls of which the white smooth blunt nucleus comprises one; suture distinct, whorls moderately convex; spiral sculpture of (between the sutures four, on the last whorl about a dozen) strong rounded close-set cords closely undulated behind the periphery by numerous low narrow axial riblets with about equal interspaces; the cords in front of the periphery are not undulated, but extend to the end of the canal; there are also very fine axial striae in the interspaces; aperture narrow, simple, the pillar with two plaits, the canal hardly differentiated. Height of shell 5.6; of last whorl 2.6; diameter 2.7 mm. U. S. N. Mus. Cat. No. 334567. La Jolla, near San Diego, Cal.; C. R. Orcutt.

CHANGES IN WESTERN MOLLUSCAN FAUNAS.

BY JUNIUS HENDERSON.

In 1889 Professor T. D. A. Cockerell (Jour. Conch., VI, 61) reported the following species as obtained by Mr. Charles T. Simpson in Lodgepole Creek, Northeastern Colorado:

Lampsilis anodontoides (Lea).
Lampsilis ventricosa (Barnes).
Lampsilis luteola (Lam.).
Anodonta grandis gigantea Lea.

Except the *Anodonta* these species have not yet been recorded anywhere else in Colorado, though we have in the University of Colorado Museum unreported specimens of the *Anodontoides* from Julesburg, Denver and Boulder. Possibly *Lampsilis* no longer lives in the State. In 1912, in company with Dr. Max M. Ellis, I visited Lodgepole Creek and searched the stream from the northern state boundary to its junction with South Platte River. We found no Unionidae except some dead shells of *Anodontoides.* Perhaps that species was still living in a deep pool a few rods south of the state boundary, though in seining it for fishes we found none. A rancher near by told us there were "clams" in the pool. The rest of the stream was shallow and so narrow one could step or jump over it in most places. Probably later in the summer of dry, hot seasons, when the natural flow was diminished and the demand for irrigation water is great, it may entirely dry up in its lower course. I wrote to Mr. Simpson, calling his attention to present conditions and the evident disappearance of the *Lampsilis,* and asking what the conditions were when he was there. He replied that as he recalled it the creek was then from 6 to 10 feet wide, but that the taking of water from the South Platte for irrigation had caused the river to go dry at Julesburg during his three years residence, and suggesting that the same thing had likely since happened in the creek. This seems exceedingly probable. Mr. Simpson also added: "The *Unio anodontoides* is probably *Lampsilis fallaciosus*, not then recognized." My intention in 1912 was to publish an account of our experience, but it was side-tracked and finally passed out of mind. It has recently been brought forward by finding in the report of the Fremont Expedition, 1845, p. 25, the statement that on July 6, 1842, Lodgepole Creek was a "clear, handsome stream" (hence at low water stage), with a "uniform breadth of twenty-two feet and six inches in depth." This confirms the supposed diminution of water in the stream in recent times.

In 1906 the bed of the lower portion of Crow Creek, east and northeast of Greeley, Colorado, was dry, except just after storms, the water percolating through the deep sand in the channel, a characteristic of many western streams. Up stream, just above

where the water disappeared, was a series of clear, rather deep pools, called "water holes," connected by a tiny, clear rivulet. In one of these pools was collected that year the type lot of *Sphaerium hendersoni* Sterki. Then came the "boom" in dry lands in Eastern Colorado. Scores of small tracts of prairie sod, many of them on steep slopes, were broken by the settler's plow. The dry soil, no longer held together by the sod, was carried into the valley by summer storms, filling many of the pools and depositing a thick coat of mud over the whole stream bed. In June, 1912, I revisited the locality, and found no clear water at all, and not a single mollusk of any species. The sluggish stream carried a heavy load of silt so fine it would not settle. Probably the Sphaerium is extinct at the type locality.

It is likely that innumerable changes in the faunas of the West are occurring as a result of the settlement of the country and consequent changes in environment. This is known to be true of birds and mammals. For this reason it is desirable that biological work in this vast region be pushed as rapidly as possible, to provide data for future estimates of biological changes.

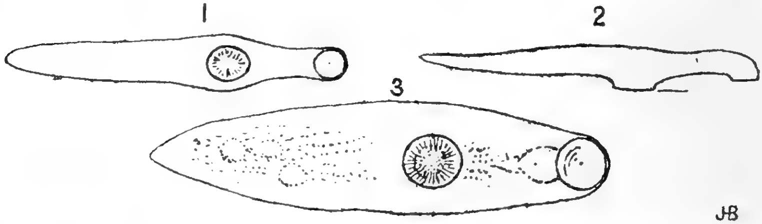
NOTES.

Hodgson Collection. I have just secured the collection of the late Chas. S. Hodgson, containing some 2500 to 3000 species, a few fossils and books. Besides his work in Illinois he did considerable collecting in other places and added to the collection by exchange and purchase.—A. A. Hinkley.

Dr. G. Dallas Hanna, who for eight years has been an assistant in the United States Bureau of Fisheries, has been appointed curator of invertebrate paleontology in the California Academy of Sciences. Dr. Hanna has for seven seasons been engaged in scientific work on the Pribilof Islands, Alaska, having taken the census of the fur seal herd for five consecutive years. He brings to the museum of the Academy his collection of mollusks which numbers about 100,000 specimens.

Fluke in Philomycus. It may be of interest to the readers

of the NAUTILUS to record the fluke found in *Philomycus carolinianus* collected at Munsonville, N. H., July 7, 1919. So little is known regarding this interesting and important microscopic animal and its destructive nature to sheep, cows and even man, I think it is well worth recording. As far as I know this is the first instance of the fluke being found in *Philomycus.* The life history of the fluke is so meagre it is impossible for me to determine the species, but the accompanying enlarged figures will give an idea of their appearance. They were transparent and without pigment spots.—J. H. BLAKE.



Figs. 1, 2 from life; fig. 3 camera drawing, under cover glass.

PUBLICATIONS RECEIVED.

DESCRIPTIONS OF NEW SPECIES OF MOLLUSCA FROM THE NORTH PACIFIC OCEAN IN THE COLLECTION OF THE UNITED STATES NATIONAL MUSEUM. By William H. Dall (Proc. U. S. Nat. Mus., vol. 56, pp. 293–371, 1919). In this paper 222 new forms are described. The standing of the genus *Neptunea* Bolten, is discussed, the name restricted to the boreal Trophons and Sars' *Boreotrophon* relegated to the synonymy.

NEW SPECIES OF AMNICOLA FROM GUATEMALA. By Bryant Walker (Univ. Mich., Occasional PAPERS, Mus. Zool., No. 73, Sept. 30, 1919). Four new species are described and figured. They were collected by Mr. A. A. Hinkley.

NOTES ON NORTH AMERICAN NAIADES II. By Bryant Walker (Univ. Mich., Occasional PAPERS, Mus. Zool., No. 74, Sept. 30, 1919). The *Unio tenerus* Ravenel, and the *Lampsilis modioliformis* Lea, are both thoroughly reviewed and figured.

ONCHIDIUM AND THE QUESTION OF ADAPTIVE COLORATION. By W. J. Crozier and L. B. Arey (Amer. Nat., vol. 53, pp. 415-430, Sept.-Oct., 1919).

FAUNA OF THE CHILKA LAKE, MOLLUSCA, GASTEROPODA AND LAMELLIBRANCHIATA by N. Annandale and S. Kemp. ANATOMY OF SOLEN? FONESI by E. Ghosh. NUDIBRANCHIATA by Sir Charles Eliot (Mem. India Mus., vol. 5, No. 4, pp. 327-379, pls. 14-16). The occurrence of *Ostrea virginica* in the warm waters of India seem very remarkable or problematic.

THE INDIAN VARIETIES AND RACES OF THE GENUS TURBINELLA. By J. Hornell, WITH NOTE ON THE GEOLOGICAL HISTORY OF TURBINELLA IN INDIA. By E. Vredenburg (Memoirs Indian Museum, vol. 6, No. 2, pp. 109-125, pls. 10-12). An exhaustive study of the variation of the Chank shell (*Turbinella pyrum* Linn.). Four new varieties are recognized, *obtusa*, *acuta*, *globosa* and *comoriensis*. The author's ideas of the rule of priority seem somewhat vague as he makes *rapa* Gmelin a form of his new var. *obtusa*.

FRESH-WATER MUSSELS AND MUSSEL INDUSTRIES OF THE UNITED STATES. By Robert E. Coker (Bull. Bureau of Fisheries, Oct., 1919, vol. 36, pp. 13-89, pls. 1-46 and map). A most interesting account of a great industry. Part I, describes and figures the species of economic value, about 41 in number. Part 2, the value and extent of the fishery, apparatus, methods, etc. Part 3, the manufacture of pearl buttons, with numerous illustrations.—C. W. J.

PROCEEDINGS OF THE MALACOLOGICAL SOCIETY OF LONDON, VOL. 13, PTS. 5 AND 6, OCT., 1919.

Description of two new species and a new sub-genus of land shells from China. By G. K. Gude, pp. 118, 119. A new *Trochomorpha* (*T. lancasteri*) and a new sub-genus and species of *Cathaica*, *C.* (*Trichocathaica*) *lyonsae*, are described and figured.

Notes on Hygromia limbata (Drap.). By Hugh Watson, pp. 120-132, pls. 2 and 3. A full description of its anatomy, etc.

On Helix revelata Britt. Anctt. (*non Férussac, nec Michaud*), *and the Validity of Bellamy's name of Helix subvirescens in lieu of it for the British Mollusc.* By A. S. Kennard and B. B. Woodward, pp. 133-136.

On the generic names for two British Ellobiidae [olim Auriculidae]. Myosotis, Draparnaud, (= denticulatus Montagu) and bidentatus, Montagu. By A. S. Kennard and B. B. Woodward, pp. 136–139.

E. Forbes's notes in his copy of S. Lovén's Index Molluscorum Scandinaviae occidentalia habitantium. By A. Reynell, pp. 140–141.

On Opeas strigile (M. & P.) and its allies. By M. Connolly, pp. 142–144, 4 figs.

Addendum to remarks on the recent species of Morum, Bolten. By J. C. Melvill, p. 145.

Notes on the non-marine Mollusca observed in East Ross and the Orkney and Shetland Islands. By K. H. Jones and A. S. Kennard, pp. 146–152.

Description of Ampullaria mermodi, n. sp. By G. B. Sowerby, pp. 152–153, with fig.

On Ammonites navicularis Mantell. By the late G. C. Crick, pp. 154–160, pl. 4.

On a Sandstone cast of Aturia aturi (Basterot), from the miocene of Western Australia. By R. B. Newton, pp. 160–167, pls. 5, 6.

The Mollusca of Marsascirocco Harbor, Malta. By G. Despott, pp. 168–183, with map.

THE JOURNAL OF CONCHOLOGY, VOL. 16, NO. 2, AUGUST, 1919.

Brachypodella oropouchensis, nov. sp. from Trinidad, W. I. By Geo. C. Spence, pp. 42–43, pl. 1.

Tropidophora standeni, nov. sp. from Madagascar. By Geo. C. Spence, p. 43, pl. 1.

Field Notes on Helicodonta obvoluta Müll. By H. Beeston, pp. 44–50.

Spirula peroni Lamarck in North Devon. By Alan Gardiner, p. 50.

Occurrence of Hartmannia septemspiralis and H. patula in England. By H. C. Huggins, pp. 51–52.

Genitalia of Azeca tridens and Cochlicopa lubrica. By A. E. Boycott, pp. 53, 54, figs.

Parthenogenesis in Paludestrina jenkinsi. By A. E. Boycott, p. 54.

Sinistral Limnaea pereger Müll. and its progeny. By J. H. Hargreaves, pp. 55–57.

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NAVAJO MOUNTAIN

Arizona-Utah line

From American Botanist, Phot. U. S. Geol. Survey

THE NAUTILUS.

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THE NAVAJO NATION.

BY JAS. H. FERRISS.

Sixty miles west of the corner post of Arizona, New Mexico, Colorado and Utah, the 1919 summer class in archæology, Arizona University, encamped at the foot of Navajo Mountain. Here is the greatest number of ancient cliff cities and villages and the greatest of known natural bridges. In scenery, colors, heroic size and architecture, it is Grand Canyon in character. Navajo Mountain astraddle the Arizona-Utah line stands on the south rim of the Grand Canyon, a short distance above Marble Canyon and Lee's Ferry.

In reality the region from the Mesa Verde National Park, Colorado, on the east, to the Zion National Park, Virgin River, Arizona, on the west, it is something of a wonder-spot of the world, and all of it astonishing. The greater cliff ruins, Mesa Verde, Keet Seel, Betatakin and many others as interesting; the Monument Park, a plateau of natural pinnacles and steeples, and the Chinle and Canyon de Chelly valleys are along the eastern border. Then westward lie the painted deserts, petrified forests, the Grand Canyon, the Kaibab forest, underground lakes of Kanab, lava cones of Mount Trumbull, Hurricane Fault, Grand Wash, canyons of Virgin River, plains of wild horses and the largest Indian population in the United States still living in the Indian way. Except to the explorers, archæologists, geologists and mineralogists it is the great unknown of America, and the farthest from a railway.

Dr. Byron Cummings, dean of archæology, Arizona Univer-

sity, and his explorer-companion, John Wetherill, post-trader and postmaster at Kayenta, Ariz., have explored and studied conditions here at this eastern border for more than twenty years, and by right of discovery (as in conchology) should have their names attached to the greater number of ruins and bridges, for they have been the first discoverers, scientifically. Herbert E. Gregory[1] for the government has made a thorough geologic survey of this eastern section covering the Navajo nation, some 22,725 miles. Others before Gregory have written and surveyed, but he is the latest and best authority. Col. Roosevelt and his boys, Zane Grey, the Kolb Brothers and other strenuous persons have visited the Rainbow Bridge but not over 150 white people all told have made the journey. Thus to the students in botany, archæology, conchology, entomology and the reptile hunters, it is a field of great promise. The health seeker and tourist will soon follow, and with profit.

The Indian population of the Navajo country as estimated in 1912 was 32,000, of which 30,016 were Navajo, 2,272 Hopis ("Moquoi" is a Navajo nickname for the Hopis), and 200 Piutes and 521 white Indian agents, teachers and traders. North of the San Juan River in Utah and Colorado adjoining is another large reservation of Utes.

From a high elevation this country appears to be and it is a plateau formation. The average elevation is about 5,500 feet above the sea. The mountains rise above and the canyons fall below this level. To the traveler negotiating the sand dunes, diving into water-worn gulches, and sliding over the wind-swept bed rocks, the plateau definition may seem a gross exaggeration. However it is a plateau, 32 per cent. from 6,000 to 7,000 feet, and 10 per cent. from 7,000 to 9,000 feet above sea level. The water of the Colorado River is but 3,400 feet at this point, and in a distance of eight miles to the peak of Navajo Mountain, 10,416 feet, a horizontal difference of 4,016 feet.

The mean annual rainfall at eight stations in and around the

[1] Geology of the Navajo Country, Arizona, New Mexico and Utah. By Herbert E. Gregory, 1917, U. S. Professional Paper, 93. Also by the same author, The San Juan Oil Field, Bul. 431.

Nation runs from 5 to 13 inches, but the variation by months or years shows a wide range, varying from one-half to twice the average. Over one-third of the rainfall may be credited to July, August and September; about 12 per cent. to April, May and June.

(*To be continued*)

ON THE MARINE MOLLUSCA OF STATEN ISLAND, N. Y.

BY ARTHUR JACOT.

During the past summer I was enabled to continue a study of the shells to be found along the southeast shore of Staten Island working beyond the region reported upon in the January (1919) number of "THE NAUTILUS."

A week was spent at Great Kills Bay and vicinity. This bay was formed by a sand-spit dropped by the lower New York Bay waters as they struck the current of the Kills which flow out at this point. Though half a mile narrower than its width (one mile), the bay is very shallow; the upper section, enclosed by high grasses except at the base of the sand-spit, is but two feet deep at low tide and covered with eel-grass, while the lower section is lined on the land side with cottages, hotels, piers, etc., is free from eel-grass, averages six to seven feet deep at low tide and is choked with launches and oyster boats. Throughout its extent, the bottom is formed of a soft, sticky clay, which mixes readily with the water. Due to this clay, the number of gasoline boats, and possibly the sewers near the entrance, the molluscan fauna consists of the hardiest species only.

Although we diluted and strained clay for hours at a time at the stations indicated, we found very few species. At one locality, dug-up clay mixed with a little sand yielded shells which from their leached-out appearance might be considered fossil. These fossil shells were much more numerous than those found above them on the surface. *Barnea truncata*, whose valves I have found in abundance lying on the bottom of the upper part of the bay a year and a half before, was not noticed.

Alectrion obsoleta was everywhere very abundant, the shell reaching a length of an inch, and occasionally having the surface largely eaten away. One was found with a prominent, biangulate carina just above the center of the body whorl so that it appears immediately above the suture on the penultimate whorl, becoming obsolete half way around that whorl. The other shells found, not including the countless fragments, were:

Macoma balthica (Linné) few, mostly young.
Mya arenaria Linné few, mostly young,
Odostomia impressa (Say) few.
Odostomia trifida (Totten) fairly common.
Odostomia bisturalis (Say) few.
Crepidula fornicata Linné occasional.
Paludestrina minuta (Totten) rare.
Lacuna vincta fusca Gould one.

The fossil shells include:

Mya arenaria (Linné) few.
Crepidula fornicata Linné few.
Crepidula glauca convexa Say few.
Crepidula plana Say rare.
Bittium alternatum (Say) The only specimen found measures 7.25 mm. in length by 2.5 mm. in width and has eight closely crowded spiral bands on each of the last two whorls.
Alectrion obsoleta (Say) abundant.
Alectrion trivittata (Say) few.
Urosalpinx cinerea (Say) occasional.

At the base of the sand-spit there is a small influx of sand where the waters of the bay have been cutting across during the last two or three years, and a new fauna is being introduced consisting of:

Venus mercenaria Linné young.
Gemma gemma purpurea (H. C. Lea) abundant.
Mya arenaria (Linné) few.
Ensis directus (Conrad) few.
Crepidula fornicata Linné few.
Alectrion obsoleta (Say) occasional.

Alectrion trivittata (Say) common.
Eupleura caudata (Say) few.
Urosalpinx cinerea (Say) occasional.

The sod-bank or *Modiolus demissus* association was to be found on any clay or hard-mud bank exposed between tides. This association consists principally of *Modiolus demissus plicatulus* packed tight one against the other or separated by *Mytilus edulis* packed just as closely, over both of which crawl *Litorina littorea* and *L. rudis.* *Modiolus demissus demissus* is found very thinly scattered among the individuals of the northern form. That the southern variety was once the predominant form over this area is evident from the fact that the sod banks on which *plicatulus* is now living contain the dead valves of the southern form exclusively, in large numbers and buried to a depth of 8 or 10 inches below the surface in company with *Mya arenaria.* I do not think the two forms interbreed.

Half a mile southeast of the bay where there is a stone jetty running out into water four to five feet deep at low tide, the rocks and bottom were searched but with very discouraging results. The water all along this section of the island is heavily laden with fine mud from the red dirt characteristic of that part of the island. This we believe to be the reason for the scarcity of mollusca along the beaches southeastward. A shattered but uneroded and still united pair of valves of *Modiolus modiolus* (Linné) were found at Seaside Beach.

Our survey of the island showed the north and northeast shore of the island to be rocky and built over by commercial interests. From Fort Wadsworth to Prince's Bay (the southeast cost) there are sandy beaches interrupted by sod-banks. As one progresses southeastward these beaches become more and more rocky to Prince's Bay, from which point and around the southern end of the island the shore is characteristically rocky. The remaining (western) coast line is lost in a maze of salt marsh. Thus there are but two places along the southeast coast of Staten Island where Mollusca are of special interest, namely, the sand flats between South and Midland Beaches and the complex about the base of the Great Kills Bay spit. The southern end of the island was not studied.

In connection with this work I have endeavored to learn what work has already been done on the Mollusca of Staten Island. The literature is as follows:

Wheatley, Charles M., Catalogue of the Shells of the United States and their Localities, 12 pp., 1842 & 1845.

Eleven species are here listed as coming from S. I., of which *Periploma leanum*, *Pandora gouldiana*, *Lyonsia hyalina* and *Astarte castanea* are mentioned as fairly common or abundant. The last one I have not as yet found on the island although it is found on the Long Island ocean beaches in increasing abundance with distance from the city.

DeKay, James E., Nat. Hist. of N. Y., Zoölogy of N. Y., Mollusca, 271 pp., 40 pls., 1843.

Pandora gouldiana, *Pholas truncata*, *Odostomia trifida*, *Columbella avara* and *C. lunata* are recorded from the island on the authority of Wheatley.

Hubbard, Eber[1] Ward & Smith, Sanderson, Catalogue of the Mollusca of Staten Island, Annals of the Lyceum of Nat. Hist. of N. Y., vol. 7, pp. 151–154, 1865.

This paper is revised in:

Smith, S., Catalogue of the Mollusca of S. I., Nat. Sci. Ass. of S. I., Proc., vol. 1, p. 35, 1886 and p. 50, 1887.

Of the 78 species listed, *Solemya velum*, *Yoldia limatula*, *Nucula proxima*, *Venericardia borealis*, *Rochefortia planulata*, *Cardium mortoni*, *Cumingia tellinoides*, *Siliqua costata*, *Zirfaea crispata*, *Epitonium lineata*, *E. humphreysii*, *Triphoris perversa nigrocincta*, *Cerithiopsis greenii*, *Bittium alternatum*, *Columbella avara*, *Mangilia cerina* (*M. plicata not mentioned*), *and Acteon punctostriata* are the rarer species listed. *Anomia aculeata*, *Pholas costata*, *Martesia smithii*, *Litorina irrorata*, *Natica pusilla*, *Alectrion vibex* and *Haminea solitaria* are of special rarity. I do not know of their having been again reported from the vicinity of the city. *Astarte castanea* is included on authority of Wheatley. The list is largely based on dredgings made about the southern end of the island by Hubbard whose collection was later sold to Crooke, whose collection now forms part of the American Museum col-

[1] The "J" in the literature is an error.

lection. Of these rarest species *Martesia smithii* [Martesia caribaea] is the only one now in the Am. Mus. (local) collection.

Davis, W. T., Variations of *Mya arenaria* on the shores of S. I., Nat. Sci. Ass. of S. I., Proc., vol. 1, p. 20, 1885.

On rocky ground the valves are of moderate size, the ends often broken and the exterior corrugated; in sandy ground the valves are very thin, of even growth, the markings complete, they are beautiful in form and color and of largest size; in peat the valves are very much deformed and much rounded.

On the distribution of *Litorina littoralis*, idem., vol. 1, p. 61, 1888 and vol. 3, p. 50, 1893.

It was first noticed by Mr. Hollick at the Narrows in 1888.

Smith, S., & Prime, Temple, Report on the Mollusca of L. I, and its Dependencies, Ann. Lyc. Nat. Hist. N. Y., vol. 9, pp. 377–417, 1870.

Herein *Odostomia trifida*, *O. bisuturalis*, *Polinices triseriata*, *Paludestrina minuta*, *Litorina rudis*, *L. littoralis* and *Lacuna vincta* are recorded as having their southern limit at S. I. This is certainly not the case with the first four species.

From these records one is struck by the decrease in the fauna accompanying the expansion of the city. One of the important factors in the extermination of the less hardy species is the crowding of the beaches for miles beyond the city limits with cottages and bungalos and the accompanying gasoline boats. This evil is obviated by the purchase of the land for large private estates and clubs.

VITREA (PARAVITREA) MULTIDENTATA AND LAMELLIDENS.

BY GEO. H. CLAPP.

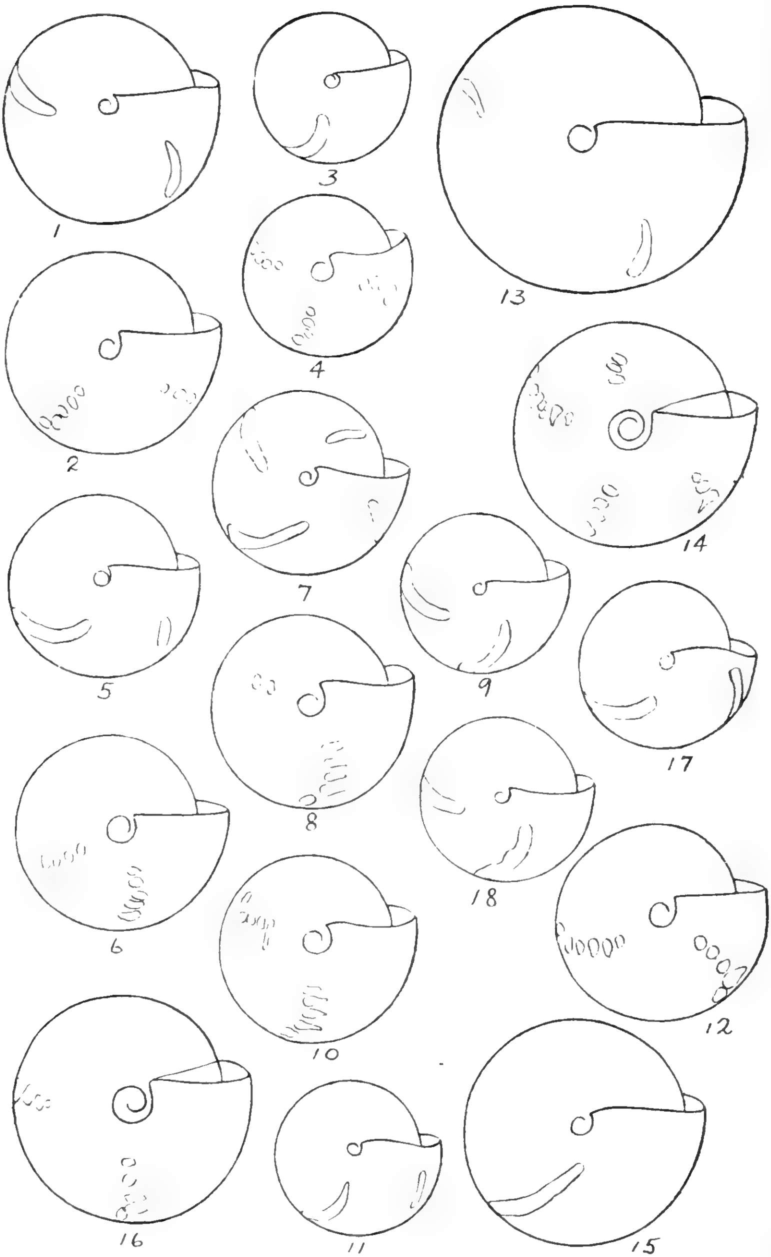
Having recently received a specimen of *V. lamellidens* from Norway, Me., I have gone over my collection with the idea of trying to find if *lamellidens* as it occurs in the north is really the same as the typical form from the Great Smoky Mountains or, as Dr. Pilsbry suggests in Proc. Acad. Nat. Sci., 1903, p. 209, merely "accelerated individuals (of *multidentata*), sporadically occurring."

The figures on Pl. III are from camera-lucida drawings all magnified 10 diameters. The shells were selected for size only, that is as near the same size as possible from material at hand, and from localities as near together as I had them in my collection. Figs. 13 to 16 are large shells of each species.

1—*lamellidens* Thunderhead, Gt. Smoky Mts.	Diam.	2.70	mm.,	Umbilicus	.29	mm.
2—*multidentata* Oakdale, Morgan Co., Tenn	"	2.70	"	"	.52	"
3—*lamellidens* Anderson, Franklin Co., Tenn	"	1.96	"	"	.29	"
4—*multidentata* Sherwood, Franklin Co., Tenn	"	2.19	"	"	.35	"
5—*lamellidens* Banners Elk, Wautauga Co., N. C.	"	2.40	"	"	.29	"
6—*multidentata* Cranberry, Mitchell Co., N. C	"	2.65	"	"	.46	"
7—*lamellidens* Litchfield, N. Y . . .	"	2.40	"	"	.29	"
8—*multidentata* Litchfield, N. Y. . .	"	2.53	"	"	.46	"
9—*lamellidens* Deering, N. H. . . .	"	2.13	"	"	.20	"
10—*multidentata* Hoosic, N. Y. . . .	"	2.53	"	"	.46	"
11—*lamellidens* Norway, Me.	"	2.08	"	"	.23	"
12—*multidentata* Quebec, Can. . . .	"	2.70	"	"	.40	"
13—*lamellidens* No. 1, large shell . .	"	3.90	"	"	.46	"
14—*multidentata* Stevenson, Ala., large	"	3.11	"	"	.69	"
15—*lamellidens* No. 1 same size as No. 14	"	3.11	"	"	.35	"
16—*multidentata* largest Quebec	"	3.07		"	.63	"
17—*lamellidens* No. 1 same size as 7, 9 and 11.	"	2.21		"	.29	"
18—*lamellidens* No. 1 same size as 7, 9 and 11.	"	2.27		"	.29	"

From the measurements given above it will be seen that in shells of approximately the same diameter the umbilicus in *lamellidens* is about three-fifths of the diameter of that of *multidentata*, the single marked exception being Nos. 3 and 4.

In figures 13, 14, 15 and 16, mature shells, it will be noticed that in *multidentata* the umbilicus widens rapidly in the last whorl while in *lamellidens* it does not. This can also be seen in the other figures, but it is not so pronounced.



CLAPP: VITREA MULTIDENTATA AND V. LAMELLIDENS

A series of 76 *multidentata* from 13 localities and 45 *lamellidens* from 8 localities were measured. Where I had only a few from a given locality all were measured, but in the case of large series a few were picked out at random. These shells ran from 1.85 to 3.28 mm. diameter in *multidentata*, 9 of them being 3.00 mm. diam. and over, and from 1.55 to 4.03 mm. diameter in *lamellidens*, 23 of them being 3.00 mm. and over.

42 *multidentata* and 28 *lamellidens*, 2.50 mm. diameter and over, gave the following averages:

V. multidentata av. diam. 2.79 mm., diam. umbilicus 0.51 mm.

V. lamellidens av. diam. 3.39 mm., diam. umbilicus 0.39 mm.

These averages show that the umbilicus is contained 5.5 times in the diameter of the shell in *multidentata* and 8.7 times in *lamellidens*.

Another difference which is well shown in the figures is the angle made by the teeth and lamellæ to lines drawn parallel to the lip and at right angles to it.

The rows of teeth and the lamellæ were counted in all of the 121 shells measured and were found to vary from 1 to 4 in *multidentata* and from 0 to 3 in *lamellidens*. In both species there is a tendency to complete absorption in the fully adult shell and in my largest *lamellidens*, 4.03 mm. diam. from Thunderhead, Gt. Smoky Mts., I cannot distinguish a trace of the lamellæ. A *lamellidens* from Thunderhead has 4 lamellæ, one of the apparently 3 being double.

The largest *multidentata* have from 6 to 6.25 whorls while the largest *lamellidens* have 6.5 to 7.

V. multidentata when adult has a well-defined callus connecting the end of the lip which is entirely absent in *lamellidens*. In both species the lip is slightly thickened when adult while in immature shells it is very thin and generally broken in cabinet specimens which accounts for the apparent difference in the shape of the aperture of the shells figured, as it was very hard to trace.

I believe that the figures and data given above prove that the two species are distinct and that the northern shells, though smaller, are the same as typical *lamellidens* from the southern mountains. Compare Figs. 17 and 18, from the type locality,

with Figs. 7, 9 and 11 northern shells. An examination of the youngest shells that I have seen would seem to indicate that *lamellidens* may be the ancestral form as in very young *multidentata* the teeth are generally fused, so much so in fact that in one of two cases I had separated them as *lamellidens;* but careful focusing of the microscope brought out the fused teeth, and measurements showed the relatively larger umbilicus.

THE NOMENCLATURE AND SYSTEMATIC POSITIONS OF SOME NORTH AMERICAN FOSSILS AND RECENT MOLLUSKS. II.

BY JUNIUS HENDERSON.

Planorbis cirrus White, 1879, from the Tertiary of Wyoming, was the next year cited by the same author as though it were spelled *cirratus.* Since then the latter name has been universally, but improperly, used instead of *cirrus.*

Physa bullata White, 1886 (U. S. Geol. Surv., Bull. 36), from the Eocene of Utah, is preoccupied by *P. bullata* P. and M., 1838, and *P. bullata* Gould, 1855. However, on page 12 of his bulletin, and in the legend of plate 3, White used the name *bullatula* for the same species, the use of *bullata* on page 22, where it was described, perhaps being unintentional. Hence White's species should be known as *Physa bullatula.* Whether Gould's species should be renamed depends upon whether it is a valid form or a synonym of some other form, which I am now unable to determine.

Physa carletoni Meek, 1872, from the Cretaceous of Utah, is incorrectly referred to as *P. carltoni* by Grabau and Shimer, 1900. Such a mistake is easily made, but unfortunately there is a prior use of *carltoni* in this genus by Lea, 1869. Though confusing, I suppose the names are sufficienty distinct so that Meek's name may stand. His species has been so frequently mentioned in various reports that it would be a shame to disturb the name unless required by the rules.

Acella haldemani White (=*Tortacella haldemani*, in Auriculidae), from the Cretaceous of Wyoming, is preoccupied by *Lymnaea haldemani* Deshayes, 1867 (=*Acella haldemani*, accord-

ing to Baker). White's species may hereafter be known as *Tortacella wyomingensis*. To disturb a name so well known is regrettable.

Paludina subglobosa Emmons, 1858, from the Tertiary of North Carolina, is preoccupied by *P. subglobosa* Say, 1825. The type of Emmons' species is lost and the figure too poor for definite generic reference. Indeed, it may even be marine. However, it may sometime be recovered, and as there is no way of eliminating it from the published literature and it must be included in any complete list of described species, it should perhaps have a name. It may be known as *Vivipara? emmonsi*. Conrad identified it with *V. glabra*, which is very doubtful.

Dall, (Contrib. Tert. Fauna Fla., 1892, p. 277) says *Compsopleura trinodosa* Conrad=*Scalaria trigemmata* Conrad, "which is a *Goniobasis*." Harris (Bull. Amer. Paleont., III, No. 11, p. 71) places *trigemmata* in *Melania*, says probably related to "*Terebra*" *plicifera* (the quotation marks are Harris's), and omits *trinodosa* from the synonymy. I have not at hand the means for determining whether *trigemmata* is a *Melania* or a *Goniobasis*, if, indeed, it can be determined. If Dall is correct in referring it to *Goniobasis*, and if Harris is correct in supposing that it is related to *T. plicifera* Heilp., a Tertiary fossil, then it would follow that the latter is also a *Goniobasis*, in which case its specific name would be preoccupied by *Melania*=*Goniobasis plicifera* Lea, a recent species, unless the latter should be removed to some other genus, as Hannibal has done. The easiest way out of the dilemma is to leave *trigemmata* in *Melania*, where Harris placed it. I pass the puzzle on to the next fellow, with these clues as a starter.

Limnaea (*Polyrhytis*) *kingii* Meek, 1877, was described from beds designated as "probably Miocene," in Cache Valley, Utah. I had supposed these beds to be Pleistocene, and Hannibal has suggested the same thing, but Dr. T. W. Stanton writes me that they are now generally considered Pliocene, or at least older than the Lake Bonneville beds, because they are more disturbed, though I believe Lake Bonneville extended into Cache Valley during its greatest expansion. I believe that *Radix ampla* var. *utahensis* Call, 1884, is a synonym of *Lymnaea*

kingi Meek. It occurs in Utah Lake and Bear Lake, both draining into Great Salt Lake, one from the south and one from the north. Obviously it could not pass from one river system to the other through Great Salt Lake as that body of water now is. Its distribution suggests that it may have passed through during the Pleistocene expansion, when its waters were freshened by overflow to the north. It probably has had a long history in the region, and there is no reason to doubt that it occurred during Pliocene time and so was contemporaneous with *kingi*, if not identical with it. As the lake at its maximum overflowed to the north, it may occur now in Port Neuf River drainage also, though Daniels and I did not find it there during a brief visit. Dr. Dall writes:

"I think your identification of the *Lymnaea* is correct. However it is to be borne in mind that the plications which led Meek to propose a genus for his species are pathological and not specific characters. They are directly due to the increase in alkaline salts in the water inhabited by the mollusks and have been imposed upon various gastropods in the same situation."

Cyrena californica Gabb, 1869, described from the Pliocene of California, is preoccupied by *C. californica* Prime, 1865, which is itself a synonym of *C. californiensis* Prime. Prime's species was described by Deshayes in 1854 as *Cyrena subquadrata*. That name being preoccupied, Prime changed it to *californiensis* in 1860, without description, but citing Deshayes' publication. In 1865 Prime described it as *Cyrena californica*, citing *subquadrata* Deshayes and *californiensis* Prime as synonyms. The name of Prime's species must therefore stand as *californiensis*. Dall in 1903 transferred Gabb's species to the genus *Corbicula*, subgenus *Cyanocyclas*. Under the circumstances it is unfortunate that Gabb's name should have to be displaced. I propose that it be called *Corbicula gabbiana*.

Cyrena obliqua Deshayes, 1824, from the Tertiary of Europe, has been placed in *Corbicula* by Vincent (Ann. Soc. Roy. Malac. Belgique, XXI, 1886, p. 136) and Taylor (Monog. L. and F.-W. Moll. Brit. Isles, No. 7, 1900, p. 413). Newton (Brit. Olig. and Eoc. Moll. in Brit. Mus., 1891, p. 57) left it in the

genus *Cyrena*. If correctly referred to *Corbicula*, it would have priority over *Corbicula obliqua* Whiteaves, 1885, from the Cretaceous of Canada. Not having access to the literature necessary for the determination of this question, I wrote to Dr. T. W. Stanton about it. He referred it to Dr. W. H. Dall, who replied as follows:

"Deshayes in his revision left *obliqua* in *Cyrena*. *Cossmann* puts it in *Corbicula*. The lateral teeth are smooth as in *Cyrena* but long as in *Corbicula*. It belongs to a small group of ovoid species which is neither typical *Cyrena* nor true *Corbicula*. Of the two attributions I regard Deshayes' as the most nearly correct, but I should include these small oval species in a distinct group from either. However, as the species has been referred at various times to *Corbicula* it would probably be best to regard the combination as preoccupying Whiteaves' name if it was made before 1885, but not otherwise."

I have no citation indicating that the combination referred to was made before 1885. Under the circumstances I feel that Deshayes' species should be left in *Cyrena* or placed in a distinct genus, and *Whiteaves'* name retained for the Cretaceous species. If anyone thinks the latter should be renamed, then it would be quite fitting to name it in honor of Whiteaves, a name that has not been used for any species of *Corbicula* as far as I can ascertain.

Some of the fossil Mollusca described by Hall in the report of the Fremont Expedition, 1845, are exceedingly troublesome. Though all assigned by Hall to marine genera, he stated that he would have considered several of them fluviatile shells except for the occurrence of *Nucula impressa* and *Cerithium fremonti* "in the same association." White, in his Review of North American Fossil Non-marine Mollusca, says they probably belong to a fresh-water fauna, and several have been definitely transferred to fresh-water genera, being now well known. Following is the list of Hall's species under discussion:

Nucula impressa=Yoldia impressa.
Mya tellinoidea=Unio tellinoides.
Cytherea parvula.
Cerithium fremonti.

Cerithium tenerus=Goniobasis tenera.
Turbo paludinaeformis=Vivipara paludinaeformis.
Turritella bilineata.
Natica? occidentalis.
Pleurotoma uniangulata.

I have been unable to locate the types of any of these species. They do not appear to be at Albany, New York, Washington or Philadelphia. The last hope seems to be the Hall material at the University of Chicago, which has not been unpacked. The latitude given for the *Mya*, *Nucula*, *Pleurotomaria*, *Cerithium tenerum*, and *C. fremonti* (Lat. 40), is incorrect, as they are definitely reported to have come from where Fremont crossed the mountains from Muddy River, which flows eastward to Muddy Creek, which flows westward into Bear River. This would be in southwestern Wyoming, above Lat. 41, probably not far from the locality of the *Turbo* and *Cerithium paludinaeformis*, which is given as Lat. 41½, instead of being 115 miles to the southward, as stated by Hall. It is not certain that these were all from the same formation or the same past locality. The *Cytherea*, *Natica* and *Turritella* are said to be from Lat. 43 N., Long. 115 W., which would place them in the Snake River Valley of southwestern Idaho, in a region occupied by fresh-water Tertiary Rocks, according to Dr. Stanton.

Nucula impressa Hall is a *Yoldia*, and has priority over *Nucula impressa* Conrad, 1848, from the Tertiary of Oregon, which, as Dr. Dall informs me, is a *Portlandia*, and both are preoccupied by *Nucula impressa* Sowerby (Min. Conch., V, 1825), a Cretaceous shell of Europe. Hall's species may be known at *Yoldia fremonti*, and Conrad's species may be known as *Yoldia (Portlandia) astoriana.*

Natica? occidentalis Hall, a "delicate shell," is said to be based upon one "perfect specimen," the mouth of which is not entire but shows that the lip was somewhat expanded, and several casts. Hall was in doubt as to its systematic position, and if the locality given is correct, it is probably not a naticoid shell. However, the name has priority over *Natica occidentalis* Meek and Hayden, 1856, from the Cretaceous of South Dakota, for which I propose the specific name *dakotensis.*

A NEW PLANORBIS FROM ILLINOIS.*

BY FRANK C. BAKER.

While making a study of the larger *Planorbis* of the Big Vermilion River, Illinois, for a paper on the distribution of the mollusks of that stream, it became apparent that two forms were included under *trivolvis* which were quite separable. One of these is the large, wide form to which Say gave the name *trivolvis*. The other is a narrower form which the writer and others have been calling *glabratus* (see Baker, Cat. Ill. Moll., p. 106) but which is not the true *glabratus* of Say, which, according to Walker (Synopsis, p. 99), does not range outside of the State of Florida. Say credited his original specimens to Charleston, S. C. The new Illinois form may be characterized as follows:

Planorbis pseudotrivolvis n. sp.

Shell sinistral, whorls 5; body whorl rounded above and below, the inner whorls carinated on both spire and umbilical region; the spire whorls are very flat and slightly concave; the earlier whorls are coiled so that they form a union with the carina of the preceding whorl but the last whorl gradually divides from this line, leaving a V-shaped depression between the dorsal carina and the body whorl; this condition is uniform for the dozen or so specimens examined: the base or umbilical region exhibits three full whorls to the umbilicus; aperture somewhat lenticular, rounded above and below, sometimes a trifle expanded, and bordered with red; color of shell yellowish or corneous inclining to brown; surface notably shining.

Height, 9; greatest diameter, 20.5; aperture height, 8; breadth, 9 mm. Holotype.

Height, 9; greatest diameter, 19; aperture height, 8; breadth, 9 mm. Paratype, 5 whorls.

Height, 6; greatest diameter, 11.5; aperture height, 5; breadth, 5 mm. Immature, 4 whorls.

* Contribution from the Museum of Natural History, University of Illinois, No. 8.

Height, 5; greatest diameter, 5; aperture height, 5; breadth, 2.5 mm. Young, 3 whorls.

(Collection Mus. Nat. Hist., U. of I., No. Z11393A.)

This *Planorbis* differs from typical *trivolvis* in being less high in comparison with its diameter, in the separation of the last whorl, above, from the carina of the preceding whorl leaving a V-shaped trough, which is not present in *trivolvis*, and in showing three full whorls on the umbilical side while in *trivolvis* there are but two full whorls. The sculpture is also more regular than in *trivolvis*, the rib-striæ being more clear cut with wider interstices. The carina on the upper whorls in *pseudotrivolvis* is also sharper and forms a raised keel bordering the spire whorls.

This *Planorbis* has perplexed Illinois conchologists for many years, being uncertainly referred to Say's *glabratus* as figured by Haldeman in the Monograph, plate 2. Whether all of the shells listed under this name in the Illinois Catalogue (p. 106) are referable to the new form is not known, specimens from these localities not being available for examination. The same *Planorbis* occurs in Pleistocene deposits in and about Chicago and has been referred to *trivolvis* in papers and references (cf. Trans. Ill. State Acad. Sci., iv, p. 112). The fossil specimens referred to this species occur at the following places (see the writer's Life of the Pleistocene, now in press by the University of Illinois, for the data concerning these and other sedimentary strata in the Chicago region):

200 feet north Dempster Street, station 47, stratum ix, silt.

200 feet south Dempster Street, station 45, stratum iv, silt.

200 feet north Oakton Avenue, station 42, stratum vii, silt.

Lemont, Lincoln Park extension office, Santa Fé R. R., stratum ii, silt.

Two fossil specimens measure as follows:

Height, 8; greatest diameter, 23; aperture height, 8; breadth, 8 mm. No. P396 (Chicago).

Height, 9; greatest diameter, 21; aperture height, 9; breadth, 9 mm. No. P401 (Lemont).

Pseudotrivolvis is not found in the earlier deposits in Wilmette Bay, Chicago, the *Planorbis* there being true *trivolvis*, while in

the later deposits the new form is the only large *Planorbis* found, an interesting case of distribution in point of time in the same locality.

Whether the new *Planorbis* is to be considered a variety of *trivolvis* or a distinct species the writer is not prepared to decide at the present time. In the material examined, both fossil and recent, there are no intermediate specimens. Until more is known it had better be considered a separate species.

A NEW FORM OF AMNICOLA FROM THE OHIO PLEISTOCENE DEPOSITS WITH NOTES ON A PHYSA FROM THE SAME FORMATION.*

BY FRANK C. BAKER.

Recently, Dr. M. M. Leighton, of the Department of Geology of the University of Illinois, placed in my hands for study a large collection of Pleistocene fossil mollusks from a marl deposit near Rush Lake, Logan County, Ohio. One of the species represented appears to be a new race of a recent species. The deposit is in the older Wisconsin drift. A paper is in preparation describing the fauna of this deposit as well as that of a possibly older deposit in Bartholomew County, Indiana, in both of which a number of interesting cases of distribution occur. I am indebted to Dr. H. A. Pilsbry and Dr. Bryant Walker for assistance in determining the affinities of the species discussed in this paper.

AMNICOLA WINKLEYI LEIGHTONI n. var.

Shell differing from *A. winkleyi* in being larger, heavier, wider in proportion to its height, the body whorl being more globose than in the typical form; there are 4½ whorls, the upper part of which is somewhat flat-sided just below the suture; this is especially marked on the last whorl of some individuals; the spire whorls are rounded and the sutures deeply impressed; the first whorl is flatter than in *winkleyi*; the umbilicus is wider and deeper and the aperture is wider in proportion to its height than in *winkleyi*.

* Contribution from the Museum of Natural History, University of Illinois, No. 10.

Length, 5.0; diameter, 3.7; length of aperture, 2.5; width, 2.0 mm. Topotype.

Length, 4.5; diameter, 3.9; length of aperture, 2.4; width, 2.0 mm. Paratype.

Length, 4.0; diameter, 3.0; length of aperture, 2.0; width, 1.5 mm. Paratype.

Specimens of *A. winkleyi* measure:

Length, 4.8; diameter, 3.1; length of aperture, 2.2. Nautilus, Type.

Length, 4.8; diameter, 3.0; length of aperture, 1.8; width, 1.5 mm. Topotype.

Winkleyi is a species of the New England States, its original locality being Saco, Maine, and that a form of this Amnicola should be found in Ohio, and in a Pleistocene deposit, is surprising. It is not unlikely, however, that *winkleyi* may occur in recent collections in the central States. The Ohio specimens seem to depart varietally from the typical form as described by Pilsbry (NAUTILUS, XXVI, p. 1, pl. 1, figs. 9–10). Some thousands of specimens from this Pleistocene deposit show little departure from the race as described above. Occasional globose forms occurring with *winkleyi* show the relationship of the form, although none have as wide a body whorl as the fossil race. It is possible that this race may occur in other Pleistocene marl deposits.

PHYSA ANATINA Lea.

A large Physa occurring in the Rush Lake deposits differs slightly from *anatina* in being larger with shallower sutures and more flat-sided spire whorls; the body whorl is wider as is also the aperture; the spire is very sharply pointed and the columella has a distinct plait. Characteristic specimens measure as follows:

Length, 16.5; width, 9.0; aperture length, 11.5; width, 5.0 mm. Fossil.

Length, 17.5; width, 10.0; aperture length, 13.0; width, 5.5 mm. Fossil.

Length, 12.0; width, 7.0; aperture length, 8.5; width, 3.7 mm. Fossil.

Length, 12.0; width, 6.0. Lea's specimen.

This Physa is related to *Physa anatina* which is so common in the States west of the Mississippi River. The occurrence of this species so far east of its usually recorded range (it is said by Walker to extend clear across southern Michigan, however) is as surprising as is the presence of the race of the New England *Amnicola winkleyi*. It was at first thought to be a recognizable race of *anatina* but the presence of narrow individuals indicates its relation to Lea's species. It differs from *Physa walkeri* in having flat-sided whorls, *walkeri* having rounded whorls and deeply impressed sutures. Many of the Pleistocene mollusca differ somewhat from their living representatives but in most cases this difference is not enough to cause their separation as new species or varieties. Among the Physas, also, the range of variation in the different species is known for but a few species; when this important characteristic is more generally known it will be safer to describe new species in this polymorphic genus.

LASMIGONA VIRIDIS, RAFINESQUE, 1820.

BY L. G. FRIERSON.

The adoption of the above as the correct specific name of the old *Unio pressus Lea* having been urged by the writer (NAUTILUS, XXIX, Sept., 1915), Mr. Bryant Walker filed an "interference" (NAUTILUS, XXIX, Nov., 1915) for the purpose he stated "*of suspending the general adoption of the proposed change until such time as certain important and probably conclusive facts can be obtained.*"

As the current year will round out a century since Rafinesque published his *viridis* the acquisition of any new facts concerning the case would seem rather remote; and as silence might be construed as consent, and the proposed "suspension" become permanent, the writer, with the consent of NAUTILUS, makes bold to again appear in court.

Rafinesque ascribed to his species the following characters:

Shell inequilateral, elliptical, obliquely truncate posteriorly. A little convex; hardly thick.

Smooth, olive green; sometimes radiate with pale yellow; others are olive-brown. The beaks are seldom eroded, being thickened there by flexuous wrinkles—remarkable because the rest of the shell is smooth.

Nacre bluish. The cardinal tooth is compressed, and *decurrent in shape.*

Being thin, it is crenulate instead of being furrowed (other members of the subgenus have them furrowed); truncature oblique, convex.

Lateral tooth thin. Muscle scars lightly impressed, confluent behind.

A small species, at most one and a half inches in altitude.

(The members of the sub-genus described just previously by Rafinesque are among the largest of the Ohio Naiades.)

Altitude $\frac{5}{9}$ of length; diameter $\frac{7}{16}$.

Rare in the Ohio, but common in the Kentucky and adjacent "*petites rivieres.*"

While to the writer the above description can be mistaken for nothing else than the Symphynota compressa Lea, further evidence seems necessary, as Lea quotes one of his friends to the effect that "it equally applies to iris."

Luckily there remains further evidence which we may adduce. Rafinesque, as is well known, divided the Naiades into numerous *Genera.* These divisions being founded upon the more evident features of the shell, it follows therefore that the contained species of any Genus *would naturally sustain a general outward resemblance to each other.*

Rafinesque described this species under the name of *Unio (Elliptio) viridis.* The *Elliptio* contained the *Unio nigra; Unio purpureus, Say; Unio crassa, Say,* and a few other shells, *all having a general outward similitude, and in such an assemblage the Symphynota compressa finds congenial associates.*

Rafinesque moreover mentions the fact that the "*Unio (Elliptio) leptodon and Unio (Elliptio) fragilis*" *also* "*resemble*" *the viridis (with some others).* The reader can easily select specimens of the two species mentioned, which resemble the *Symphynota compressa to a remarkable extent*—differing, however (as Rafinesque observes), in their teeth.

Finally, we observe that Rafinesque in his description of a variety of "*alasmidonta*" wrote that the latter is *so much like Unio viridis, as to be easily mistaken for it*—for which cause he named the shell *Alasmidonta viridis.*

This statement may be compared with an observation made by Mr. C. T. Simpson, who wrote that the "Unio pressus Lea, and the Margaritana rugosa Barnes sometimes resemble each other so much that one is labeled with the name of the other by competent students."

An Ohio shell, of subsolid texture, elliptical in shape, with an oblique posterior truncature; green, sometimes brownish, sometimes rayed with yellow; having its beaks crowned with flexuous wrinkles; a cardinal tooth thin, compressed and *decurrent*, bearing an outward similitude to the old *Unio gracilis Barnes, and a still more striking likeness to an "alasmidonta" can but be, the writer thinks, the Symphynota compressa Lea.*

The main objections offered by Mr. Walker for his "interference" arose from the failure of his records to show that the *compressa Lea* ever occurs in the Ohio River—the shell, Mr. Walker informs us, being "*most emphatically a creek or small river species.*"

Mr. Walker's records however might be profitably amended by the inclusion of the interesting circumstanee that the type locality of Lea's Symphynota compressa is the Ohio River at Cincinnati (Index Obs. Genus Unio).

Mr. Walker's "reason No. 4" is a slight variant of a statement made by Dr. Lea (Rectification, P. 35).

If Conrad and Say radically differed as to what an identical valve was (which it *is said was seen by both*) the writer fails to see how their disagreement should be chargeable to Rafinesque's diagnosis of the *Unio viridis.*

Walker's "reason No. 5" need be discussed no longer, as it was categorically rejected by Dr. Lea long ago (Rectification, P. 34) with whom the writer is heartily in accord.

The writer has seen it stated that the ratio which the altitude bears to the length, given by Rafinesque for *viridis* (5 to 9) does not agree with specimens of *Symphynota compressa.*

Mr. C. T. Simpson (*Catalogue, 1914*) gives dimensions of three examples of the *compressa.* The writer takes it, that *the*

average of these three, given by such an authority, should satisfy the most exacting.

The *average* of the examples given by Simpson, gives a percentage of .556. The percentage which Rafinesque gives for *viridis* (5 to 9) is .555.

A closer agreement is not to be found in the history of the Naiades!

Note—The translation of Poulson contains many errors.

1. The dimensions, one and a half inch is that of the *altitude*, not as in Poulson.

2. The lateral tooth is *thin*, not slender.

3. The cardinal tooth is not *divergent*, but is *decurrent—quite a different thing!*

TURRITIDAE VS. TURRIDAE.

BY S. STILLMAN BERRY.

The unfortunate rehabilitation of the nondescript names of the Museum Boltenianum has brought about as one direct consequence the overturning of the time-honored generic name *Pleurotoma* Lamarck in favor of Bolten's *Turris*. Accepting the change as most seem to have been impelled to do, it thereupon follows that since *Pleurotoma* was the typical genus of its family, a change in the generic name necessitates a similar alteration in the family name to conform. The reigning regulation in Article 4 of the International Code of Zoological Nomenclature is ostensibly so explicit regarding such matters as the formation of family names that at first thought one would not anticipate much disagreement among students in its specific application. In the instance under consideration, however, two opposing views have found their way into print.[1] Both cannot be equally correct, and since the family is an abundant one and frequently referred to, while a general principle of orthography is likewise involved, it becomes a matter of some importance to determine which of the two, as we may adopt the spelling *Turritidae* or *Turridae*, is strictly the proper form to use. Curiously enough

[1] NAUTILUS, v, 23, pp. 131, 144.

each variant appears to date back to the brothers Henry and Arthur Adams, who, although using the genus *Turris* as of Humphrey rather than Bolten, wrote the family name *Turritidae* in the first volume of their great review of molluscan genera,[1] and then later corrected it to *Turridae.*[2] Their more mature judgment is therefore plainly in favor of the simpler spelling. It is mainly very recently that the insertion of the extra syllable has been revived.

The essential facts of the case are believed to be fairly stated thus:

1. "The name of a family is formed by adding the ending *idae*, the name of a subfamily by adding *inae* to the stem of the name of its type genus." [3]

2. The name of the type genus of the particular family in question is *Turris*, presumably an exact transcription of the Latin noun *turris*, meaning in English, "tower."

3. The name of the family in question is variously spelled *Turridae* and *Turritidae* in the literature. The spelling *Turriidae* has also been suggested for consideration.

4. In Latin grammars (*e. g.*, Allen and Greenough), *turris* is often given as the example *par excellence* of an i-stem noun, the stem therefore ostensibly *turri-*.

5. A recent proponent of the spelling *Turritidae* writes that he "submitted the question of 'Turridae *versus* Turritidae' to two expert Latinists, who, after due consideration of all the data, concluded that, while either was correct, the latter term under the circumstances was to be preferred. Here the matter now appears to rest.

Now the writer has been one of those adhering to the spelling *Turridae*, and being still unconvinced of his error, yet eager to arrive once for all at a correct and therefore permanent usage, he submitted the case essentially as outlined above to a friend, a well-known student of Latin, Professor B. O. Foster of Stanford University, adding thereto the following specific queries:

[1] Genera of Recent Mollusca, v. 1, p. 87.

[2] *Op. cit.*, v. 2, p. 614.

[3] International Rules of Zoological Nomenclature. Article 4 (Smallwood edition, p. 4).

(1) What is the stem of *Turris?* (2) Is it possible to insert a *t* in the second syllable of this stem without changing the nature of the word itself? (3) In view of the facts as stated, and in strict adherence to Article 4 of the International Rules, what do you consider to be the preferred orthography for the family name based on this genus? (4) Do you consider any alternative spellings permissible?

Professor Foster's reply is so detailed and withal so interesting that with his kind permission I am reproducing the major portion of it here, especially since it seems conclusive regarding the points at issue.

"The stem of *turris* is *turri;* and the ending *ides* would give us *turriides.* But it is a rule of word-formation that 'the final vowel of a stem is lost before the initial vowel of a suffix, *e. g.*, *aur-eus* ('golden') from auro- (aurum).' (Hale and Buck, Latin Grammar, 205.2.) Therefore we may at once rule out *Turriidae* as a possible derivative, in favor of *Turridae* (I give the plural, as this seems to be what you want; the singular would be *turrides*).

"The ending in question is really a Greek suffix, used to denote that the name in question means the son (or descendant) of the person designated by the simple noun. Thus *Turrides* would mean 'son of a Tower,' and *Turridae,* 'the sons of a Tower,' or 'the Tower family.' When I say that it is Greek, I do not mean that it is not found in Latin; it is found frequently, but always, I think, in Greak patronymics (or Latin patronymics consciously formed in imitation of the Greek ones), which the Latin writer (usually a poet) has occasion to introduce into his text. Examples would be: *Pelides* 'son of Peleus,' *Philyrides* 'son of Philyra.'

"As to the form *Turritidae,* it is obviously meant as a derivative from the adjective *turritus.* The stem of this adjective is *turrito,* but, as above, the final short vowel would be dropped before the initial vowel of the ending *-idae,* and *Turritidae* is therefore correctly formed. But it is to be observed that the suffix, or ending in question is employed in Latin authors only in composition with the names of persons, nouns substantive, and that *Turritidae* would therefore be decidedly anomalous.

We might translate it 'family of a the-turreted,' but the fact remains that the Latin authors would not have said anything like that. . . . Unless there exists some zoological reason for preferring a word that would mean 'members of the family of the thing that is provided with towers' to one meaning 'members of the Tower family,' I should much prefer the shorter and more Latin (or may I say less *un*-Latin?) *Turridae*."

The facts therefore seem decisive that *Turritidae* is an impossible construction as a direct derivative of *Turris*, and that *Turridae* is correct and should be used. The spelling *Turrinae* for the typical subfamily logically follows by the same reasoning.

REDLANDS, CALIFORNIA, *December 29, 1919.*

ON CERTAIN OF LINK'S NAMES IN THE MITRIDAE.

BY J. R. LE B. TOMLIN.

The rarity of Link's work entitled *Beschreib. Nat. Samml. Univ. Rostock* (1807) is doubtless the reason why his specific names are but little known. Coming as it does before Lamarck or Dillwyn began to make their extensive contributions to nomenclature, it will, I believe, eventually be found to have anticipated these two authors in many cases. Link in the above work lists 20 Mitras, of which the following are noteworthy:

Pt. iii, p. 127. *Voluta stictica* Link; *V. papalis* B. Gmel., 3459; Mart. iv, 147, 1356.

It is curious that this shell was not differentiated by any 18th century author. Most of them considered it a var. of *papalis;* Bolten confused it with *cardinalis.* The synonymy is:

1807. *V. stictica* Link.

1811 (early in). *Mitra abbotis* Perry.

July, 1811. *Mitra pontificalis* Lamarck.

p. 127. *Voluta digitalis* Link; *V. pertusa* J. Gmel. 3458; Chem. x, 151, 1432, 1433.

This specific is generally ascribed to Dillwyn. Synonymy as follows:

1807. *V. digitalis* Link.

July, 1811. *Mitra millepora* Lamarck.

1817. *Voluta digitalis* Dillwyn.

p. 127. *Voluta papilio* Link. No fig. quoted, but the ex cellent description enables one to recognize this as a synonym of *sphærulata* Mart.

p. 127. *Voluta clathrata* Link. No fig. quoted, and the description is not determinable. It is said to be like *pertusa* Gmel. but not coronate, cancellate, deeply punctured in the furrows. The name *clathrata* Gmel. is already in use in *Mitra* and therefore *clathrata* Link may conveniently be dropped.

p. 127. *Voluta elegans* Link; *V. plicaria* B. Gmel. 3452; Chem. x, 151 (by error 157), 1444, 1445.

This is a much earlier name for the *Mitra* universally known as *regina* Sow., which dates from 1828; but Link's name cannot be used as it is preoccupied by Gmelin.

Mitra elegans Reeve, Conch. Ic. pl. 29, f. 233, may be called *buriasensis*, and *M. elegans* H. C. Lea, Am. Journ. Sci. & Arts, 40.102, *alabamensis*.

p. 128. *Voluta ornata* Link. No fig. quoted, but I do not think that there can be any doubt that the description is a clear and accurate one of *taeniata* Lamarck as now understood. *Mitra ornata* will therefore supersede *M. taeniata*.

M. ornata A. Ad., P. Z. S. 1851, 135, may be renamed *M. adornata*.

M. ornata Kien.=*M. rossiae* Rve.

M. ornata Schubert and Wagner never seems to have been subsequently recognized.

p. 128. *Voluta variabilis* Link. Mart. iv, 148, 1364.

This is a synonym of *Mitra rugosa* (Gmel.)=*corrugata* Lam.

M. variabilis Rve., Conch. Ic., pl. 13, f. 95, is thus preoccupied and I rename it *polymorpha*.

p. 128. *Voluta schröteri* Link; Schröter's Einl. I, 221, pl. i, f. 13. Dillwyn quite independently founded a *Voluta schroeteri* on the same figure, which has been considered by Martens and E. A. Smith to =*Mitra picta* Rve. (cf. Ann. Natal Govt. Mus. I, pt. i, 32). It seems impossible to identify with certainty.

NEW SPECIES OF WEST COAST SHELLS.

BY MRS. IDA S. OLDROYD, STANFORD UNIVERSITY, CAL.

Tritonalia fraseri n. sp. Plate IV, figs. 1 and 2.

Shell of medium size, very elongate, narrow; whorls including the nucleus, which is present on nearly all the specimens collected, suture distinct and deep, whorls strongly shouldered, with six strong ribs spinose at the shoulder; body whorl with nine strong spiral cords and with incremental ones between. The shoulder is very strongly rugose, and has from one to two spiral cords, the second whorl has four strong spiral cords and three incremental ones; the third has three strong spiral cords and no incremental ones; aperture elongate-oval, interior yellowish to purple-brown, columella thickened and nearly straight, canal long, straight and closed in the adult. It differs from the typical form in the very elongate form, and the absence of the basket-like sculpture in some specimens on the fifth and sixth whorl the basket sculpture shows faintly.

Type locality is Brandon Island, Departure Bay, Vancouver Island.

It is named in honor of Dr. C. Mclan Fraser, of the Dominion Station, through whose help we were given every facility possible for collecting while at the Station in May, 1919. The type is in the Oldroyd Collection, Stanford University. Cotypes are at Dominion Station and U. S. N. M.

Pecten kincaidi n. sp. Plate IV, figs. 3, 4.

Shell subcircular, the height and length being nearly equal; equivalve, both valves slightly convex; ears as in P. islandicus; base evenly rounded; color yellowish-white with reddish-brown markings. Left valve with 28 narrow round-topped imbricated ribs, and very faint intercalaries, the interspaces wider. Right valve with 25 broader flat-topped ribs, some of which are divided toward the margin. Anterior ear (the larger) with 7 ribs, the posterior ear with 5 ribs. This species resembles *P. jordani* Arnold, but the valves do not tend to contract suddenly at the basal margin as in *P. jordani*, and the right ear is larger.

The ribs on the right valve of *jordani* are all divided from near the umbones.

One fine specimen (the type) living was obtained in July, 1919, and one was taken in July, 1918, but is much thicker shell, a little larger than the type. Named in honor of Prof. Trevor Kincaid, of the Univ. of Washington, to whom we owe so much good material. Type is in Oldroyd Coll., Stanford University, No. 89.

Pecten islandicus pugetensis n. var. Plate IV, figs, 5, 6.

Shell much smaller than the typical, sculpture coarser in proportion to the size. Shell more elongate and the ribs spinose. Ribs 17 with a very fine one in the interspaces.

The type is in the Oldroyd Collection, Stanford University. Type locality off San Juan Island, Puget Sound. 12 specimens were obtained, two from the dredge, and ten from rocks on shore.

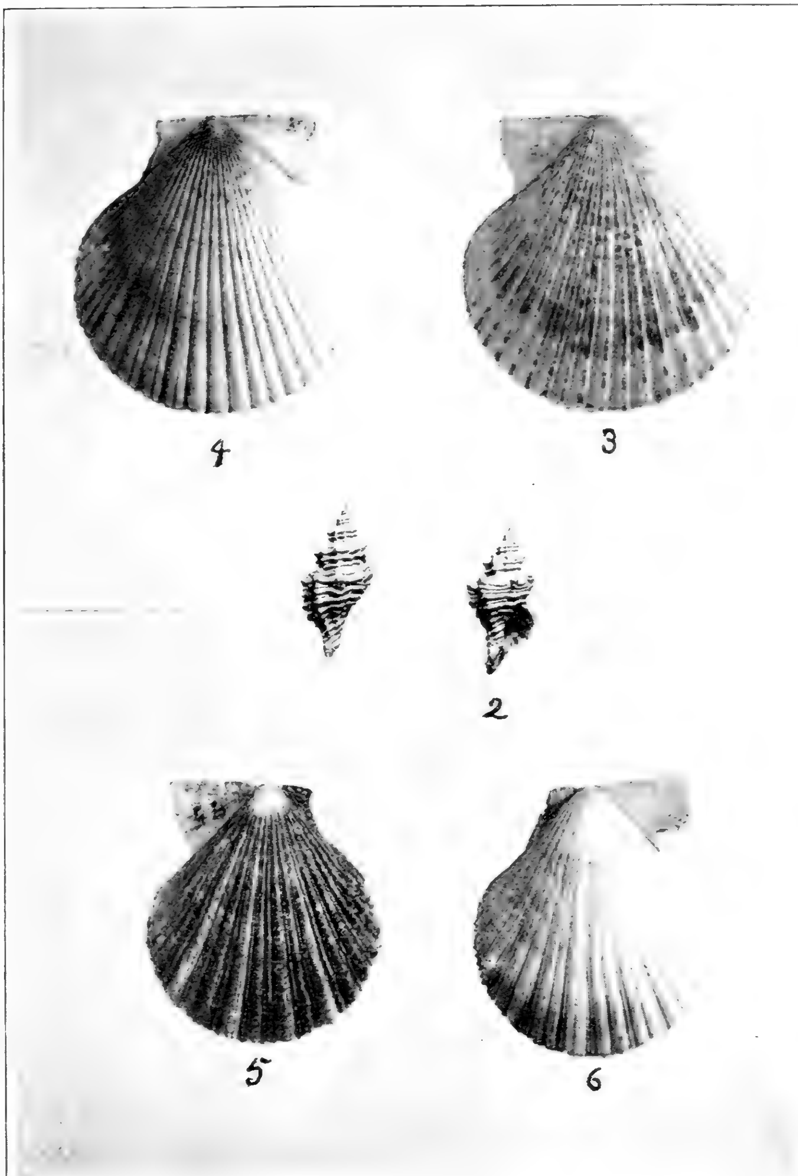
HERBERT HUNTINGTON SMITH.[1]

BY GEORGE H. CLAPP.

The sudden death of Herbert Huntington Smith on March 22nd last, at University, Alabama, meant more, perhaps, to the conchologists of the United States than we now realize, although the collecting and serious study of shells was the work of the later years of his life.

Born at Manlius, New York, on January 21, 1851, and graduated at Cornell University in 1872, he early in life became interested in natural history, and made some collections in different branches. Mr. Smith told me that his first real work was on fossils; and he later became interested in insects. When he began to collect the mollusca, I do not know; but when he joined the Carnegie Museum of Pittsburgh, he had quite an extensive general collection. Between the years 1870 and 1886 he made several trips to Brazil and altogether spent about eight

[1] A portrait of Mr. Smith was published in the number for July, 1919.



OLDROYD: WEST COAST SHELLS

years in exploring and collecting. He collected such shells as he saw, but did not specialize on them.

In answer to my inquiry Mrs. Smith wrote:

"In Brazil I only remember a few odd lots of land shells until we got to Corumbá on our way home; it was rich in land shells, but Mr. Smith said that the mosquitoes were 'frightful.' In order to do a morning's work of collecting, he had to tie his sleeves tight at the wrist, do the same thing with his ankles; tie a bandana around his neck; fill his pockets with cigarettes and matches; put a cigar in his mouth, 'grit his teeth,' and start. All the collecting there was almost a torture, so I imagine shell collecting was quite a cursory affair."

The number of shells collected on that trip was very large, although the species were not numerous; but a number of them were new to science. These shells were widely distributed, probably by Dr. Newcomb, and when we see the locality "Corumbá, Brazil," we may feel pretty sure that we are looking at Smith's shells.

During the time he was in the West Indies, for the Royal Society, and in Mexico, for Mr. F. D. Godman, he collected "everything," and naturally shells proved to be no small part of his "catch."

When he went to Colombia, in 1898, I arranged to take all of his land shells, but he got so interested in collecting mammals, birds and plants that the return in shells was not very large, except in some of the larger and more conspicuous species. There he again ran into the "insect pests," and at one place, near the coast at Santa Marta, he said the "sand flies" poisoned him so that the skin even peeled off the palms of his hands. His final breakdown in 1902, he always attributed to the poison of sand flies, gnats, mosquitoes, and the thousand-and-one other curses of the tropics.

In 1903 his health still being poor, he gave up the fight, and resolved to go to the South to live. He settled at Wetumpka, Ala., and at once started after shells. His first collecting there, so different from work in the tropics, was rather disheartening, and he wrote that there were no shells in that region. A little later he began to get results, and then he wrote, "I didn't know how to collect," and when the first lot came in, it was seen that

he had struck a remarkably rich region. Then a "Syndicate" was formed of T. H. Aldrich, of Washington, D. C., Mr. Bryant Walker, of Detroit, Dr. H. A. Pilsbry, of the Academy of Natural Sciences, Phlladelphia, Pa., and the writer, and the work was carried on steadily for over six years. Dr. Pilsbry dropped out in 1906, and he was replaced by Mr. John B. Henderson, of Washington, D. C.

The naming and distribution of the thousands of land shells collected in all parts of Alabama, fell to the part of the writer, and the new species have all been described by him; 13 species and 4 varieties up-to-date, with probably several more to follow, as the material is more carefully studied. After the regular work for the "Syndicate" was stopped, Mr. Smith continued collecting fresh-water shells for Mr. Walker, and land shells for the writer, while collecting Tertiary fossils for the Geological Survey of Alabama, by which he was employed as Curator of the Museum at the University of Alabama. The sorting, naming and distributing of the fresh-water shells, was done by Mr. Walker, and I cannot do better than quote from a letter from him, on this subject:

"I enclose the meager list of n. sp. and vars. that have been described from Mr. Smith's material. But that does not begin to show the enormous amount of work that he did in developing the fauna of Alabama. Besides going the whole length of the Coosa from Gadsden to Wetumpka by boat, he did the Black Warrior thoroughly before it was spoiled by the Government improvements (?) and spent a season on the Mussel Shoals of the Tennessee. Two or three summers were spent on the Connasauga and other head-waters of the Coosa, and in numerous side trips he had covered practically the whole state. Then, too, through local collectors, many of them trained by him, he had reached into many localities that he did not personally visit. By these means he collected an enormous amount of material, practically none of which has been worked up.

"While he worked for the 'Syndicate' he collected everything; but when that arrangement ceased, he specialized in the *Unionidæ* and *Pleuroceridæ*. I have not any very accurate figures on the number of specimens of *Unionidæ* that he collected, but I think that from 40,000 to 50,000 would not be an overestimate. His Black Warrior collection alone he reported as 10,000. No report on this material has ever been made, and a

very large proportion of it still remains to be worked over. This I shall do as rapidly as I have time. I also have on hand many thousands of specimens of *Amnicolidæ* that haye not been sorted out. And the same is true of a very large amount of *Ancylidæ* from the Coosa and its tributaries.

"But it was especially in the *Pleuroceridæ* that he put in his best work. He became exceedingly interested in that family and the many perplexing problems that its protean species presented, and it was his expectation to work it up himself. The enormous collection, thousands upon thousands of specimens, and the familiarity that he had acquired in his many years of field work, especially fitted him for the work. But unfortunately the multitude of duties that pressed upon him, as Curator of the State Museum, prevented him from carrying his plan into execution. He had planned to publish a paper on the *Anculosæ* of the Coosa for some time, and expected to write it up this last spring. He had gone so far as to arrange a series of the species in the order that he intended to present them, but his untimely death prevented the completion of the work. Beyond this, and a somewhat similar arrangement of the *Gyrotomas*, nothing has been done and, except the manuscript names attached to many species that he believed to be new, and which he intended to describe, there is absolutely nothing left to show the vast knowledge that he had acquired of that marvelous fauna. He had it all in his brain, and it all perished with him. I do not suppose that any other man ever had such an intimate knowledge of the variation of that family, and to think that it is all gone, is truly pitiful.

"I do not believe that the fauna of any other State in the Union has ever been so thoroughly worked as was that of Alabama, by him."

I do not know how many new species were collected by Mr. Smith in Brazil, the West Indies and Mexico, but the following is the list from Colombia and Alabama:

COLOMBIA.

Glandina callista Pilsbry and Clapp.

Circinaria ponsonbyi Pilsbry and Clapp.

Circinaria ponsonbyi var. clara Pilsbry and Clapp.

Aperostoma sanctæmarthæ Pilsbry and Clapp.

Aperostoma smithi Pilsbry and Clapp.

Helicina sanctæmarthæ Pilsbry and Clapp.

Helicina cacaguelita Pilsbry and Clapp.

ALABAMA.

Musculium transversum decisum Sterki.
Pisidium compressum coosaense Sterki.
Pisidium compressum contrarium Sterki.
Pisidium limatulum Sterki.
Pisidium noveboracense alabamense Sterki.
Pisidium atlanticum dispar Sterki.
Pisidium atlanticum albidum Sterki.
Rhodacmea cahawbensis Walker.
Rhodacmea gwatkiniana Walker.
Somatogyrus decipiens Walker.
Somatogyrus hendersoni Walker.
Somatogyrus pygmaeus Walker.
Neoplanorbis carinatus Walker.
Neoplanorbis smithii Walker.
Neoplanorbis umbilicatus Walker.
Clappia clappi Walker.
Polygyra smithi Clapp.
Polygyra inflecta approximans Clapp.
Polygyra decepta Clapp.
Polygyra barbata Clapp.
Polygyra brevipila Clapp.
Polygyra brevipila cherokeensis Clapp.
Polygyra cohuttensis Clapp.
Vertigo alabamensis Clapp.
Vertigo alabamensis conecuhensis Clapp.
Vertigo oscariana "Var." (not named.)
Omphalina pilsbryi Clapp.
Vitrea lewisiana Clapp.
Vitrea aldrichiana Clapp.
Vitrea cumberlandiana Clapp.
Vitrea (Paravitrea) conecunensis Clapp.
Vitrea (Paravitrea) pilsbryana Clapp.
Carychium nannodes Clapp.

Dr. W. J. Holland, Director of the Carnegie Museum, Pittsburgh, has written a very appreciative article on the life and work of Mr. Smith, in Science, N. S. Vol. XLIV, No. 1273, pages 481–483, May 23, 1919, where other fields of activity are touched upon; but to cover the whole subject would demand a volume. It is to be regretted that Mr. Smith was not able to carry out a plan he long had in mind, of working up his extensive series of notebooks into a story of his life as a collector, as it would have been an inspiration to future collectors, and would, I feel sure, have been worthy to place alongside of the

classic works of Bates and Wallace. He was a remarkably keen observer, as shown by his letters, so his notebooks undoubtedly contained a vast amount of most valuable observations. Even when feeling "down in his luck," he always saw the funny side of life, and had a large stock of humorous stories, which he would frequently insert in his letters, for no other reason, apparently, than that he just happened to think of them.

NOTES.

VERTIGO OVATA AND V. HEBARDI IN FLORIDA.—Both *Vertigo ovata* and *V. hebardi* appear to be rare in Florida, as you will see by the list below giving records from my collection. The number found is added for each locality.

Vertigo ovata Say.

Snapper Creek Hammock, south of Miami (2).
Madeira Hammock, southern Florida (1).
Lower Matecumbe Key (5).

Vertigo hebardi Van.

Pumpkin Key (3+fragments).
Big Pine Key (1).
Elliotts Key (2).
Porgy Key (9+fragments).
Little Palo Alto Key (3).
No Name Key (1).
Lignum Vitae Key (1).—GEO. H. CLAPP.

In a most interesting article by W. J. Wintemberg, "Archaeology as an Aid to Zoology" (Canadian Field-Naturalist, Vol. 83, Oct., 1919, pp. 68–72), an error in the distribution of *Litorina irrorata* Say has crept into print, in quoting from G. G. MacCurdy, "The Passing of a Connecticut Rockshelter" (Amer. Jour. Sci., Vol. 38, p. 517, 1914). *L. irrorata* is not confined to Florida, but is found more or less common along the entire coast from New England southward. Vineyard Sound, "sparingly" (*Verrill*). New Haven, "not at all common" (*Perkins*). Stratford, Conn., "on high sedges" (*Linsley*).

Huntington, L. Isl. (*S. Smith*). It is locally common in the marshes along the New Jersey coast.—C. W. JOHNSON.

FASCIOLARIA PAPILLOSA SOWERBY. In regard to my reference to this species in the October NAUTILUS, p. 45, Mr. J. R. LeB. Tomlin says: "I have the Tankerville catalogue before me and on p. xvi of its Appendix I find: 1552, *Fasciolaria papillosa.* F. testa fusiformi, apice papillosa, anfractibus transverse striatis, mediane nodosis; apertura intus laevis; caudâ longâ, long. $3\frac{7}{10}$, lat. $1\frac{3}{10}$ unc.

"It is not figured nor is any locality given." It may possibly be a young *F. gigantea* but from the above description it seems unrecognizable.—C. W. JOHNSON.

PHYSA SMITHIANA new name for PHYSA SMITHII.—Dr. Bryant Walker has kindly called my attention to the fact that the name *Physa smithii* used in my paper "Fresh-water Mollusca from Colorado and Alberta" (Bull. Amer. Mus. Nat. Hist., XLI, p. 535) is preoccupied by Clessin (Conch. Cab., Planorbis, p. 294) for a *Physa smithii* from Australia. I therefore change the name to *Physa smithiana.*—FRANK C. BAKER, University of Illinois.

AN AMENDMENT.—In the January number of the NAUTILUS, on page 103, I inadvertently omitted from the list of Simpson's catch of Unionidæ at Lodgepole Creek, *Anodontoides ferussacianus* Lea. The omission makes the next sentence unintelligible or misleading, according to the interpretation placed upon it by the reader.—JUNIUS HENDERSON.

PUBLICATIONS RECEIVED.

EXPERIMENTS IN THE BREEDING OF CERIONS. By Paul Bartsch (Carnegie Institution of Washington, 1920). It is well known that in this genus each colony "presents certain slight characters by which we can distinguish its members from those of other colonies. The question arises, are the forms in the var-

ious colonies fixed forms; that is, will generation after generation yield the same mode in measurements, or will changes in the local environment from season to season affect the developing organisms to such an extent as to produce an unending series of slight variations? These were the problems that called for a solution. The hope of throwing some light upon these questions prompted the breeding experiments which were started in 1912."

Colonies of 200 each of two species from Andros, *Cerion casablancæ* and *C. viaregis* Bartsch were originally introduced on certain of the Florida Keys. In 1915, 800 *C. crassilabris* from Porto Rico, and in 1916, 8,317 *C. uva* from Curaçao were planted on Loggerhead Key. The shells were marked by filing. Some of these colonies have now produced a second generation of Florida-grown offspring. The present paper contains records of the results. In the case of *C. viaregis* Dr. Bartsch finds that the variations in the first and second generations are entirely within the range of the species in its original locality; the changed environment "has not affected them in such a way as to produce such differences as one observes between the various colonies in the Bahamas." *C. casablancae* gives practically the same result. The same holds with the first Florida generation of *C. crassilabris.*

On Newfound Harbor Khy *C. viaregis* has hybridized with the native *C. incanum.* The offspring show a remarkable range of variation; forms near typical *C. incanum* and typical *viaregis,* all intermediates between these, but also forms closely resembling the mottled *C. martensi* group of the Bahamas. A state of flux has been produced by cross-breeding. The experiments indicate also an unusual fertility, and the suggestion is made that "crossing has an energizing effect which seems to enable the new product to surpass its associated congeneric forms in the production of offspring."

Dr. Bartsch suggests that during the glacial period, when the low state of water united the numerous Bahaman Keys, extensive crossing took place, this resulting in the efflorescence of new forms which we find to-day.

A valuable section treats of the soft anatomy, which shows

considerable divergence among the species. Other biologic notes and information on the ecologic relations of Cerions are given. 59 plates fully illustrate the material.

Dr. Bartsch's experiments clearly have important bearings upon systematic zoology as well as upon the doctrine of evolution generally.—H. A. P.

MOLLUSCA OF THE CROCKER LAND EXPEDITION TO NORTHWEST GREENLAND AND GRINNELL LAND. By Frank C. Baker (Bull. Amer. Mus. Nat. Hist., Vol. 41, pp. 479–517, pls. 25–27, Dec., 1919). An interesting review of some of the arctic mollusks, especially of the Buccinidae of which *Buccinum tanquaryi* and *B. ekblawi* are described as new.

FRESH-WATER MOLLUSCA FROM COLORADO AND ALBERTA. By Frank C. Baker (Bull. Amer. Mus. Nat. History, Vol. 41, pp. 527–539, Dec., 1919). *Planorbis similaris, Physa smithi* and *Galba alberta* are described and figured as new.

NEW SHELLS FROM THE NORTHWEST COAST. By William H. Dall (Proc. Biol. Soc. Wash., Vol. 32, pp. 239–252, Dec., 1919). Ten new species and varieties and a new genus *Pantellaria* (type *Megerlia monstruosa* Scacchi) are described.

LOCOMOTION IN TWO SPECIES OF THE GASTROPOD GENUS ALECTRION WITH OBSERVATIONS ON THE BEHAVIOR OF PEDAL CILIA. By Manton Copeland (Biol. Bull., Vol. 37, pp. 126–138, 1919).

THE CENTRAL NERVOUS SYSTEM OF NUCULA AND MALLETIA. By W. A. Hilton (Jour. Ent. and Zool., Vol. 11, pp. 75–78, 1919).

NEW SPECIES OF MOLLUSCA FROM VARIOUS DREDGINGS TAKEN OF THE COAST OF NEW ZEALAND, THE SNARES ISLANDS AND THE BOUNTY ISLANDS. By Miss M. K. Mestayer (Trans. and Proc. N. Zealand Inst., 1919, Vol. 51, pp. 130–135, pl. 8). *Liotia suturi, Orbestella hinemoa, Crossea cuvieriana, Leucosyrinx thomsoni, L. cuvierensis* and *Vepecula cooperi* are described as new.

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THE NAUTILUS.

Vol. XXXIV JULY, 1920. No. 1

THE NAVAJO NATION.

BY JAS. H. FERRISS.

(*Concluded.*)

In northeastern Arizona sandstone and shale of different periods are the prevailing types, geologically. The Carrizo range and a small country about sixty miles north of Holbrook, Arizona, and a few needles thrust through the desert floor here and there belong to the igneous group. Less than one-tenth is limestone, and in character of little worth to the snail industry.

Vegetation is not so plentiful or varied in character as in the region lying southward to the Mexican border, but much of the material is new to collectors, and some of the species new to science. At an elevation between 6,000 and 7,000 feet juniper (*J. monosperma*) and pinyon (*P. edulis*), and up to 8,500 feet yellow pine (*P. ponderosa*), quaking asp, spruce and oak prevail, with columbines, phlox, aconitum, larkspur in the usual mountain profusion. Ferns are rare.

W. N. Clute, editor of the American Botanist, and the present writer, both of Joliet, Ill., were invited to join the class of 1919. They needed no urging. The good ship Ford, chafing at its Tucson anchorage was in line at Flagstaff July 1. Leaving the Lowell Observatory with the Normal School faculty and several pleasant people, a run was made over to Grand View, on the Grand Canyon, about 70 miles, to organize, get acquainted and make a fresh start. It is one of the best views of the

canyon. The auto parties camp here, but the hotel, now owned by W. R. Hearst, is idle. The forest rangers' camp is nearby but otherwise there is no settlement here at present. *Sonorella coloradoensis* (Stearns) was found at the type locality. Scenery, fine air and the yellow-blooming century-plant (*Agave utahensis*) were of particular interest.

Tuba City was our next camp, and it was necessary to return to the San Francisco Mountains, 14 miles from Flagstaff to cross the Painted Desert. This is the fourth time we have passed this range with a peak of 12,794 feet and everlasting snow. Surely Oreohelix is up there in the quaking asps, but no conchologist has made a track so much as on the foothills.

At Cameron (Tanner) crossing was made over the canyon of the Little Colorado on a suspension bridge built by the government. There was but a thread of water in the muddy flats one or two hundred feet below. A little scratching here during the luncheon hour did not turn up anything in the rocks or drift. The road was fairly good and the autos hummed along merrily over wide stretches of black lava, pebbled agate, iron marbles and other geological curiosities, and at other stretches, for a change, painted canyon walls and miles of grotesque wind-made statues furnished entertainment. Although delayed four hours in starting we traveled 122 miles and went into camp early that day at Tuba. Purchased from the Mormons, this is now a government city of schools, agency buildings, an agricultural experiment station and a hospital.

Sand is the chief product of Tuba City, but springs are numerous and the fields of grain and the orchards were thrifty. At the boiling spring in our camp a new Pisidium and *Physa humerosa interioris*, n. subsp. were gathered. Also cases of the case-fly and a fair collection of dragon flies. A large scarlet species was the prize.

John Lee, of Mountain Meadow memory, was one of the founders of Tuba. Later he established Lee's Ferry on the Colorado, and later again at Mountain Meadow met his Waterloo. On the rocks of Moenkoppi Wash is the village of Moenkoppi. The homes and stores of these ancient cliff-dwellers were closely inspected by the class, also their fields of corn,

orchards and vineyards, hundreds of acres. School diplomas, photographs and three-colored illustrations decorated their walls, and clocks and sewing machines seemed home-like. They are neat housekeepers, hospitable and surely happy.

These so-called Quaker Indians, the Hopis, and also the more or less war-like Navajos, Utes and Piutes, with a few goods bought from the traders—salt, sugar, baking powder and calico—live as they have always lived. They are farmers with fields of grain, alfalfa and vegetables in the low spots of the desert; operators in live stock, manufacturers of blankets, pottery and jewelry. The estimate of 1912 gave this nation 330,000 horses, 33,000 cattle, 1,500,000 sheep. They dress in styles of their own, in dwellings cling to their ancient architecture and keep their blood pure Indian. The Hopi has permanent dwellings, four and five stories high, and perhaps may be the original inventor of the Philadelphia sky-scraper apartment. The Navajo with his solitary and temporary hogan of sticks and mud, the Ute and Piute with tepees of skin or canvas, follow their flock to the herding grounds, all at peace, one with another, really not knowing tribal boundaries. There may be a two-thousand-dollar auto in the front door yard of Mr. Navajo if the ground is that level. The remainder of the family surplus may be invested in government bonds, a banner with a star in gold hanging from a door that is something like a muskrat home, but they make their own moccasins and calico breeches, and some of them still think they can whip the United States. Since we broke camp one of those cockey white men, prospecting for minerals against Indian instructions, was found lying by a water hole on our trail and the signs of his taking-off were Navajo.

The Hopi is a model Indian. He saves his money, never had a quarrel with Uncle Sam, and without government bounties has made his own living. A trader told us that when a Navajo sold him ten dollars worth of wool he traded out the full amount and asked for nine dollars more of credit, but the Hopi left a quarter and took home nine seventy-five in cash.

The Navajo refused to dig for pottery, as the flu had given them a scare; but we liked them and their splendid horses were

kindly, well-broken and intelligent. Without a guide or guidance they carried us for miles over naked sandstone where there was not a scratch to mark the trail. Saddles of Navajo make are in good taste and stand up well with the best of the saddler's art.

"Boy, boy," came from a group of smiling Hopis at Tuba, pointing to cavalry pantaloons as the girls climbed into cars. The dogs barked, and with the government veterinarian in his own Ford to lead us, the sand flew over the dunes to Kaibito. Here Wetherill and his horses had been waiting for three days. The cars were stored in the trader's wool house, and two days later we threw down the shovels and anchored those horses and mules in the junipers of Endische Springs at the south foot of Navajo Mountain.

There had been little opportunity for collecting, but while watering our stock at two branches of Navajo Creek the drift was found rich in small shells. The streams contained excellent drinking water and were twenty or thirty feet in width. A large amount of timber had been floated down from the mesas, but we were traveling fast. *Physa humerosa interioris* was found in the stream among the horsetails and water cress.

With the best of water spouting from the rocks, a beautiful view and a delightful climate we settled down into a permanent camp, began to feel acquainted and call each other by front names. These pupils and instructors were a splendid group of uncomplaining pottery diggers. Nearly every western state was represented. Their forebears had been pioneers from Plymouth Rock to California, and thus good sense and the square deal came just natural.

From the southern approach Navajo Mountain is an oblong dome, regular in form, longer east and west, without peaks or precipices, "rising four thousand feet above the flat floor of the Rainbow Plateau, an island in the midst of a sea of water-worn and wind-worn brilliantly colored sandstone," says Gregory. A nearer view and a little travel finds precipices in plenty. In fact so rough were the crags we found but one horse trail to the upper levels, and that ended at War God Springs about half way to the summit. Here at the springs is a fairly level bench

in the yellow pine about a mile in width along the southern and eastern slopes. The talus covered with quaking asp largely composed of heavy sandstone blocks is an ideal situation and *Oreohelix* was at home. The summit of about two hundred acres fairly level is heavily clothed in spruce, and over the top, under the precipices are occasional springs that feed the streams crossing the Rainbow trail below. Many fairy bowers, coves and valleys are hidden here for botanists and snail seekers. Here we found a new Phlox (*clutei*); *Oreohelix yavapai cummingsi* n. subsp. and *Gonyodiscus shimeki cockerelli* Pils. were found in their most robust form.

All of the mountain is sandstone, or so near it that shells and their hunters notice no difference. "Cretaceous sandstones cover the top and Jurassic (?) sediments constitute the flanks," to speak authoritively. The sandstone for the whole region is rather variable in character due perhaps to the several binding materials—lime, silicon, iron, manganese, etc. Many specimens were brought to camp, and Prof. Scott's verdict ran to sandstone with an occasional decree favorable to petrified wood.

Navajo Mountain has good soil for snail life, so fertile it is not probable that all the species were gathered. At a spring on the south slope known to us as the Red Rock Spring, *Oreohelix yavapai clutei* n. subsp. was discovered accidentally in the grass and rose bushes. *Succinea avara* was also here in the bogs. Among the rocks of a large canyon west of Endische Springs we found the bones of *Oleohelix yavapai neomexicana* Pils., but found no live ones. This canyon heads in a saddle near the main peak of the mountain and for convenience may be known as Big Pine Canyon until further orders. The north and northeast slopes were not fully explored although three of our party camped at War God Springs the better part of a week. The great rock slides of those slopes probably contain the best snaileries. Four Oreohelix tribes per mountain is a new record for Arizona.

Before returning home Mr. Wetherill and his Indians led the way to the War God Springs and then on foot to the top of the mountain for the view over the San Juan country, and then

around the base of the mountain on horseback to the Rainbow Bridge. On the mountain top an *Oreohelix depressa* came to the surface following a shower of rain, in every way almost identical to the shells found by Henderson and Daniels at stations 22 and 23, 1915, near Ogden, Utah. The forest rubbish about the springs was alive with Pupas and Zonitids and Vallonias. A few *Oreohelix yavapai neomexicana* Pils. were in the rock slides.

The outlook from the crest overlooked the Rainbow Bridge, the canyons of the San Juan, other canyons, bridges, caverns, domes, sunlights and shadows, white, brown, and all the reds and all the shades of the amethyst. Also the plateaus beyond the Grand Canyon, the Henry Mountains, 11,410 feet, the Blue, 11,445, Aquarius 10,100, LaSal 12,271. Also the white and black mesas and the Carrizo mountains to the south and east were in view.

The Rainbow Bridge is in the strict rainbow form and with some of its colors. But 30 feet in thickness, with its 309 of altitude and 208 width, in lightness of architecture it seemed something of steel. The average camera does not give an accurate estimate of sharp hillsides and scenery large as this bridge.

It rained a little these evenings, but the bridge kept us dry, and at a camp in Surprise Canyon blankets were spread in wind holes of the cliff. To imitate the swallows, heads and feet were made to peep out a little. At the bridge one of the party imitated the pack rats for a little while and for the first time in his desert experience made a complete collection of fleas. The chute of Zane Grey is an interesting feature of this trail, so narrow it seemed the walls in passing could be touched with either hand, and so high the passage was gloomy. Abduction Cliff and the balanced rock that exterminated the wicked band were true to photographs, one on the trail the other at Navajo Creek, thirty miles away.

In fiction, details in scenery and character should be true to life, though a little latitude may get through of a geographical character. We know Grey's Roaring River, and we camped for weeks at the corral he helped to build for Silver

Mine; we know his Painted Desert, and have struck his trail in so many places we know his details are accurate and well done.

Hon. David Rust, of Kanab, schooled at Leland Stanford University, an editor and twice a member of the Utah legislature, said the only fault "here is that Gray deals in ancient history." Well, so it is with many of us. We do not ask to have witchcraft, intolerance, superstition or any of those disgusting household remedies spread on the records.

David and his son, David Jordan, gave us a pleasant surprise at Endische Springs. They were cousins of mine and it was our first meeting. Our mothers' ancestors, Ezekiel Brown and wife and two sons were kidnapped by the New York Indians and kept in captivity nearly four years. Rust and Ferriss thus inherited their wild ways, and had much in common to talk about. Ferriss all his life, too, because of this family episode, has been tracking New York Indians, especially up and down Wall Street.

A couple of young boys from New York City, taking in the sights from Zion Park to Mesa Verda, were in the care of the Rusts, Arnold W. Kohler, Jr., and Chas. P. Schulzheimer. Though but seventeen they were live wires educationally and went off at the end of a few days with the hearts of us all. They saw a large yellow snail walking up the rocks at Rainbow Bridge, a *Sonorella*, perhaps, but we found only *Succinea avara*, *Physa humerosa interioris* and *Pupilla hebes*.

Loaded with pottery and other material historic, after a few weeks of toil we returned to Kaibeto, assisted by Navajos and their horses. Here we met John Lee, a grandson of the Lee Ferry John, who brought in a report that we were at Navajo Mountain in a starving condition and that the girls had worn out their shoes. The Lees may be a little peculiar, but in a sparsely settled country rumors seem to spring from the ground and spread remarkably fast.

It is a day's journey from Kaibeto to Marsh Pass via Red Lake, by auto or across country by horseback. The Dean and our Navajo friend Leslie made the journey on horseback, for there were ruins on the way. The main party returned to Red Lake and switchbacked to the Pass. The roads had been damaged by late rains and both parties were a day late.

The trader at Red Lake opened house for us and between the stores of the trader and our camp chest it was something like a return to civilization. The living room above the store was well equipped and the ladies took possession, the gentlemen making their nests in the sand-dunes.

These trading posts are constructed much on the plan of the old frontier forts. The buildings are strong, the counters high and sometimes screened, for in their trade discussions the Navajos may resort to direct action. A few traders have lost their lives in these disputes and some of their goods. One of these was an elder brother of Wetherill. We look back with much pleasure to the over night at Red Lake.

The road to Marsh Pass led through the Klethia valley. Lake reservoirs, fields and corrals by the road side, luxuriant sunflowers and fire-weeds promising greater agricultural development, is our recollection of the ride. Marsh Pass is a rocky cut between the Black and Skeleton Mesas. An abundance of firewood and water stored in natural cisterns make this a convenient camping place, and Leslie kept camp while the entire class on foot explored the ruins for a couple of days in Laguna Canyon.

It was a pleasing journey of six miles along the floor of the canyon with high cliffs and palisades to the noted Betatakin ruins of 148 rooms. A rain storm overtook the lagging snail party, and while they were crouching under overhanging cliffs they were given an exhibition of many bridal-veil falls breaking over the precipices. The forest dooryard at Betatakin was somewhat damp the remainder of the day, but the quaking asps and spruce were swarming with Pupillidæ, and here was found something new, *Pupilla hebes* mut. *albescens.* The damp collectors by a fire and protected by the city arch slept the sleep of the honest toiler and dried their clothing. The ladies descended ladders from the roofs and spread their blankets on the smooth sandstone flooring. The gentlemen slept on rocky shelving above the houses and the Dean, Casabianca to the core, stayed by the cooking beans and got wet.

"Betatakin is a homelike spot," is the first thought of the visitor. The arched cavern in the cliff is 400 feet in width,

460 in heighth, opening to the west, has an easy approach, a spring of excellent water at the base, a heavy forest and a wall five hundred feet or more high, and a small stream of water in front. It seems the most delightful and romantic of situations for village life. The ruins have been partially restored by the government, and our class for the coming summer propose to make it their home while exploring a number of newly-discovered ruins near by. Supplies will be assembled at Kayenta.

A return to the main branch of Laguna Canyon and a walk of eight or ten miles further from camp the following day in which the party was somewhat delayed and strung out by the ripe currants along the trail, brought us to the Keet-Seel ruins. This city has about the same number of rooms as Betatakin, the arch was about the same, but faced east. The forest was not as heavy, the water not as convenient, it had not been restored as it should be, and access was a little difficult. The approach is negotiated by steps cut in a deep slope of sandstone for about forty feet with a hand-rail laid flat on the surface for safety. Thus those who approach must come humbly on all fours. The pottery was a rich find at these ruins and there still remain many wagon loads of the broken material.

The probabilities are that the Hopis were compelled to leave these delightful homes against their will; that they were too easily penned up here by the war-like Navajos and their Apache cousins. At least the Hopis now live on the small and high mesas of the desert where they can see out in every direction, watch their flocks and fields and get a fair view of all who approach. Such is the theory. The decorations upon pottery, the architecture of dwellings and community buildings, with timber, corn and pumpkin rinds preserved these hundreds of years by the overhanging arches, are substantially the same as those now in use by the Hopis of Moenkopi and Walpi.

Upon the return journey bones of *Lymnæa* in the bed of the creek, in banks, washes and ant-hills above started an investigation, and it was found that these shells were imbedded in a streak of marl and peat soil sometimes a dozen feet below the canyon floor. Wetherill told us that thirty-five years ago the valley contained a chain of swamps fed by the stream. A sim-

ilar condition was found at Fredonia, Arizona, by Ferriss and Daniels in 1910. The older residents said that twenty-five years before the Kanab Wash was clothed with grass and there was merely a few damp spots here and there along the valley, that the cattle had cut a trail down the valley and this trail had been deepened year after year by the stream. In 1910 the water of Kanab Wash was 90 feet below the floor of the valley and a permanent stream was of such a volume as to be known as a river. A recent freshet had taken out the community dams storing water for domestic use at Kanab and Fredonia, and the village streets were still muddy from the disaster. Perhaps these two streams and many others had a big cut the same season and by the same freshet. We see much evidence of this cutting and also of some filling. Perhaps after a stream here is cut to the bed rock it again fills with brush wood and soil washed from above.

Lymnæa stagnalis appressa Say was found in the canyon peat and it may perhaps still be found alive in some of the ponds and lakes of the mesas. We saw the lakes but an auto party is too fast for pond snails. *Lymnæa* (*Galba*) *palustris* (Müll). *Lymnæa proxima* Lea, *Lymnæa* (*Pseudogalba*) *parva*, *Planorbis trivolvis* Say, and *Succinea retusa* Lea, now a stranger to the locality. were also gathered; but the material was in poor condition, the shades of night were coming fast, all alone in an Indian country and it had been a twelve-hour walk. It was ten before the camp fire was beckoning at Marsh Pass.

Wetherill came to escort us to his home at Kayenta the next morning, and then led us two more days on horseback through Monument Park where peaks, steeples and effigies more than a thousand feet high seem to stick up through the plateau floor. While waiting for the snake dance, nearly a week of delight in desert literature, paintings, photographs and evening lectures was our lot at this club-like home. It is something of a headquarters for the government explorers, and for all sorts of writers, artists and students who desire to know something of the Navajos.

The party divided here, one half returning home, the other going on to the snake dance at Walpi. The journey of two

days by auto was made in five, owing to weather conditions. We enjoyed the journey through the Chinlee valley where with government assistance thousands of acres of corn were under cultivation, and the side-winder rattler was added to our collection.

We also stumbled into Ganado, headquarters of the Hubbel string of trading posts established some forty years ago. Hon. Lorenzo Hubbell, its head, many years a representative of the territories of New Mexico and Arizona in Congress, was at home. Here was another museum of Indian baskets, blankets, paintings, desert books and the many things Indian we were looking for. Paintings of all the patterns in blankets used by the Navajos were on the walls, and one hundred at least of the original portraits in sepia of Indians by that best of artists, Elbridge Ayer Burbank.

Lorenzo Hubbell, Jr., of Oraibi, was a delightful acquaintance. In an empty Buick he overtook us the next morning after the Ganado visit. "Throw in a lot of those dunnage bags and some of those girls and I will help you the next ten miles; the road is rough that far," he said; and we went to it and built a bridge. When the flood from the cloudburst had passed we ran ahead into another cloudburst and built another bridge, the men folks, including Hubbell, pulled off their shoes, rolled up their pantaloons and waded through the mud and cactus for half a day in their bare feet, built bridges, dug out machines with shovels and their bare hands, pushed and slipped and tumbled until dark, and Hubbell stayed with us through it all. He was plainly that kind. When the cowboys and Indians saw him at a distance they grinned the width of their face, came up, slipped off their horses and shook hands heartily.

Humiliating to relate, an Indian boy with a burro was employed to pull out a car we could not push, and did it. On another occasion two men of our party, stuck upon the hillside of the San Juan, had their machine pulled over the top by a Najavo woman and her burro, with merely a rope around the donkey's neck.

The snake dance of the Hopis terminates an annual nine-day

religious ceremony, a prayer for rain. Here were seven hundred spectators from coast to coast, as interested and respectful as these deeply religious Indians themselves. About sixty or seventy live snakes were carried around the ring in the mouths of the priests, one snake at a time. Twenty or more of these exhibits were the common poisonous rattler—the side-winder or Edwards' massasauga (*Sistruris catenatus edwardsi* B. & G.), and the other the prairie rattler (*Crotalus confluentus* Say). No fangs were pulled, no persons bitten, no fainting, none were awe-stricken. There was no frenzy. Everybody cool and satisfied. Even those who paid a dollar for a watermelon or fifty cents for a loaf of bread ate calmly, politely and said nothing.

The party again divided at Holbrook, and at Galup Mr. Clute left for home and Cummings and Ferriss made a side trip to Montecello, Utah, via. the Ship Rock agency and Cortez, Colorado, thus avoiding the Ute Mountain and passing over the toes of Mesa Verde with its great ruins.

The Blue Range, known on some of the maps as the Altas Abajo, is about eight miles from Montecello. The walking is good and the lumber road lands one at the sawmill on the north fork of the Montezuma Creek, the very heart of the mounlain range. These peaks are covered by thick groves of aspen and spruce with large open spaces of coarse grass and slides of sandstone fringed with wild currants and raspberries. Here again *Oreohelix y. cummingsi* was found abundant in the shale and also scattered among the rock slides and the aspens, with *O. cooperi* and *O. depressa*. At station 365 a few *cummingsi* were found approaching the albino form. At station 370 in tall grass *O. cooperi* was variable in size, also in the same environment in the vicinity of the copper mines, our Sta. 366. As a rule these were much smaller than those found in the aspens. The collecting conditions are ideal and this range should he further explored. In the few days given to the work collections were not made farther than a couple of miles from the sawmill in any direction. Some of the maps show that it is about forty miles from the sawmill to the Elk ridge on the west.

It was heart-breaking to leave without shaking hands with

the La Sal range, so convenient to Montecello, a stage running to the La Sal P. O. at the foot of the range. Then, too, there was the Carrizo range a short distance from where we crossed the San Juan at Ship Rock, but duty called us away from this new and prosperous agricultural section. (This is thrown in because the Dean had just harvested over 3,000 bushels of wheat from less than seventy acres of sage-brush land.)

September 13th the party again divided, Ferriss to Joliet and the Dean for Tucson, taking with him a couple of young Wetherills to the University, adding with his machine that much to our desert journey. The girls did their part like men, there was no sickness, no accidents, no great adventures and it was the most enjoyable picnic ever in the most country per acre ever.

Concerning the little ones: *Pupilla syngenes* Pils. and *syngenes dextroversa* P. & F. seek the well-drained hillsides where grass roots and spawls of stone lying upon the soil furnish shelter. So far they have not been gathered in deep forest conditions where pupas mostly congregate. The first of these was found alive in the grassy hummocks under the dry cliffs of the Black Mesa at Marsh Pass and again at Kayenta.

The other was associated with *Oreohelix y. clutei* in the rose bushes and grass at Red Rock Spring on the south slope of Navajo Mountain.

Gastrocopta pellucida hordeacella (Pils.), *Pupoides hordaceus* (Gabb) and *Gastrocopta cristata* (Pils. and Van.), of the plains, are seldom found alive. When dead shells appear in the ant-hills a little patience and some time may obtain a few live ones in the grass, chips of wood or surface stone in that vicinity. The great harvest of these (dead) has been found in the drift of streams draining the plains.

Thysanophora horni at Brownsville, Texas, is at home in leaf mold of the mesquit thickets, and has colors and bristles. In Arizona it is found under conditions so dry no other snail except *Succinea avara* will keep it company, but it thrives and is found in large numbers with the *Chænaxis* pupas in rock piles shaded by cliffs.

The *Thysanophora ingersolli* group keep company with the

Pupillidae, *Zonitoides*, *Gonyodiscus*, *Vallonia*, *Vitrina alaskana*, *Euconulus*, and *Cochlicopa lubrica*, in deep rock slides and damp forest rubbish.

Some of the others than those mentioned in this paper are here located from the notes: *Pupilla hebes* (Anc.), fossil beds of Laguna canyon; leaf mold Navajos and Blue Mountains and the Black Mesa at the Rainbow Bridge, in moss and horsetails (*Equisetum*).

Pupilla hebes mut. *albescens*, now published for the first time, in the aspens at the Betatakin ruins, abundant and variable, sometimes toothed, albino.

Pupilla blandi Morse, drift of Chinlee and wash near Adamana.

Gastrocopta ashmuni (St.), drift of a wash from the north, near Adamana, Arizona, and in the drift of a branch of the Chinlee near the Utah boundary.

Gastrocopta procera mcclungi (Hanna and Johnson), drift near Adamana.

Vertigo ovata Say, drift near Adamana and Navajo Creek near the Tso ranch, and fossil beds of Laguna Canyon.

Vertigo coloradoensis arizoniensis, Pils. & Van., fossil beds of Laguna Canyon, drift of Chinlee near Utah boundary.

Vertigo modesta insculpta Pils., War God and Two Springs, Navajo Mountain, Blue Mountain, Snow Spring near Montecello, Utah, drift of Navajo Creek near Tso ranch.

Vallonia gracilicostata Reinh., Blue Mountain and the fossil beds of Laguna Canyon.

Others collected that seem to be common to the region wherever conditions are favorable were the following: *Vallonia perspectiva* St. and *cyclophorella* Ckll., *Gonyodiscus cronkheitei anthonyi* (Pils.), *Zonitoides alachuana* (Dall), *arboreus* (Say), *Polita indentata umbilicata* (Ckll.), *Euconulus fulvus* (Müll), *Vitrina alaskana* Dall, *Cochlicopa lubrica* (Müll.), *Pupoides marginata* (Say), *Gastrocopta pilsbryiana* (St.), *Succinea avara* (Say).

ON THE EROSION AND THICKNESS OF SHELLS OF THE FRESH-WATER MUSSELS.

BY N. M. GRIER, PH. D., HOLLINS COLLEGE.

In connection with another investigation, I had opportunity to summarize what is apparently most of the literature dealing with these little discussed and connected phases of the ecology of the Naiades, and now wish to present it in the light of other points this investigation brought out.

Hey (1), compared shells of *U. pictorum* and *U. tumidus* from the Ouse and Foss Rivers in England. The Ouse River is a wide and deep stream with a great deal of mud and receives a variety of drainage material. Hey believed the erosion of the shells in it was due either to the dissolved CO_2 in the water, or the rapidity of the current, for in the Foss River, where conditions were generally opposite ones, they showed little such disfigurement or none. Shrubsole (2) states erosion in shells may be attributed to the low percentage of lime in the water, which he analyzed, and found to be positively correlated with this fact. Beauchamp (3), also, felt that erosion might be due to dissolved carbon dioxide, for he found that shells were considerably eroded in streams flowing through limestone formations; moreover dead shells in water containing an abundance of lime were similarly affected. March (4), however, states that shells from districts highly charged with CO_2 have thin shells, which are not eroded at the beaks, and was inclined to attribute this to the absence of humic acid, "which does not occur where limestone does; or the absence or excess of chalk." Cooper (5) states that badly deformed shells are found in water of excessive saltness, while Baker (6) noted in *Cardium*, a marine pelecypod, that thinness of shell seemed correlated with the saltness of the water. Finally, Rich (7) tells of some shells (*Unio complanatus*) from a soft-water lake in New York which were almost free from lime. Further on in this paper it will be shown that while the waters of Lake Erie contain more lime than those of the Upper Ohio Drainage, shells are comparatively thicker in the latter.

It is at once observed that more of the above writers ascribe

erosion of shells to the presence of CO_2 in the water. This is also confirmed in a way from the interpretation of geologic data, which gives evidence of the solvent power of "carbonic acid." Not only is CO_2 being continually liberated in nature in other ways, but there is hardly any doubt but that the interaction of humic acid often present in streams with lime may also produce CO_2. Thus the observation of Shrubsole, whose shells were collected from a drainage containing a diversified material, may plausibly fit in here. Of course the fact must never be excluded that coarser material carried along by the current also plays a part in the erosion of shells, but the consequences of such a factor may be intensified by the chemical reactions which already may have taken place. Most of the eroded shells I have examined come from streams having an abundance of gravel. Again, it is probable that in some cases an abundance of lime in a stream may neutralize the humic acid before the latter can produce any marked effect.

Later on, some evidence will be presented in support of March's contention to the effect that high $CaCO_3$ content of the water somehow inhibits absorption of material, preventing the shell from becoming as thick as it might. This, however, is only a phase of the well-established principle that living cells are able to control the absorption of substances used in their metabolism. Since it is admitted that the lime of shells comes from the water in which they live, there is reason to think there may be some correlation—positive or negative—between the amount of lime present and the thickness of the shells. Several investigators have indicated their probable attack of this problem, but so far there does not seem to be any published results.

Having already secured data on the thickness of the shell and reduced it to a convenient factor, (the thickness just superior to the pallial line directly beneath the umbo, divided by the height), I found a publication of the U. S. Geological Survey (8) which fortunately gave analyses of the water at the same or what seem to be reasonably adjacent points to where my material had been collected. All the localities concerned—collecting, and points where analysis of water was taken, are indicated in the data which appear to correlate for my conclusions in the table.

TABLE SHOWING RELATION OF $CaCO_3$ CONTENT OF WATER TO THICKNESS OF SHELL.*

No. Spec. measured.	Genus and Species.	Locality.	m. m. Th.	Parts per million $CaCO_3$.	Stations at which analyses taken with remarks.
8	Fusconaia flava	Allegheny River	.0975	51.4	Parker, Tarentum.
8	Fusconaia flava	Ohio River	.1182	61	Natrona, Pittsburgh.
8	Fusconaia flava	Monongahela River	.142	72	McKeesport, Monongahela.
8	Fuscanaia flava parvula	Presque Isle Bay, Lake Erie	.121	90	Erie, Pa.
15	Amblema costata	Allegheny River	.1495	61	At nearest point, Meadville.
15	Amblema costata	French Creek	.1506	127	
15	Amblema costata	Allegheny River	.1495	51.4	
15	Amblema costata	Ohio River	.1986	61	
4	Amblema costata	Shenango River, Pulaski	.1477	47	Analysis at nearest point, Sharon.
44	Amblema costata	Conoquenessing	.1957	66	
15	Amblema costata eriganensis	Presque Isle Bay, Lake Erie	.1385	90	Erie, Pa.
4	Amblema costata eriganensis	. . . .	.1221	90	Erie, Pa.
13	Pleurobema obliquum	Allegheny River	.1271	61	
13	Pleurobema obliquum	French Creek	.1205	127	
5	Pleurobema obliquum	Allegheny River, Warren, Hickory	.1117	54	Oil City, Warren.
5	Pleurobema obliquum	Allegheny Biver, Kelly	.1061	51	
9	Pleurobema obliquum	Kiskiminitas Drainage	.1142	50	Kiskiminitas and Conemaugh Rivers.
9	Pleurobema obliquum	Kelly, Allegheny River	.1144	51.4	Tarentum.
9	Pleurobema obliquum	Little Mahoning Creek	.1551	26	
9	Pleurobema obliquum	Kelly, Allegheny River	.1144	51.4	Exception.
9	Pleurobema obliquum	Shenango River, Clarksville	.1162	47	Analysis at adjacent points, Sharon and Greenville a greater alkalinity at lower station.

* Where no specific locality is stated, shells from nearest point on map to locality where analysis was made are to be considered.

TABLE—*Continued.*

No. Spec. measured.	Genus and Species.	Locality.	m. m. Th.	Parts per million $CaCO_3$.	Stations at which analyses taken with remarks.
13	P. obliquum pauperculum	Presque Isle Bay, Lake Erie	.1146	90	Erie, Pa.
9	P. obliquum pauperculum	....	.1206	90	Erie, Pa.
15	Elliptio dilatatus	Kiskiminitas Drainage	.1235	50	Kiskiminitas River.
15	Elliptio dilatatus	Kelly, Allegheny River	.1256	51.4	Tarentum.
12	Elliptio dilatatus	French Creek	.1091	61	Exception.
12	Elliptio dilatatus	Kelly, Allegheny River	.1256	51.4	Tarentum.
8	Elliptio dilatatus	Little Mahoning Creek.	.1156	26	Exception.
8	Elliptio dilatatus	Kelly, Allegheny River	.1131	51.4	Tarentum.
4	Elliptio dilatatus	Loyalhanna River, Kiskiminitas Tributary	.135	50	Conemaugh and Kiskiminitas Rivers.
4	Elliptio dilatatus	Cheat River, Monongahela Tributary	.1216	35	Cheat River.
13	Elliptio dilatatus	Allegheny River	.1144	51.4	Tarentum.
13	Elliptio dilatatus	Ohio River	.1181	61	Pittsburgh.
21	Elliptio dilatatus	Shenango River	.0921	47	Average, Sharon, Greenville.
22	Elliptio dilatatus	Slippery Rock Creek	.1092	66	Connoquenessing.
5	Elliptio dilatatus	Greenville, Shenango River	.0952	47	Sharon.
5	Elliptio dilatatus	Shenango River.	.0901	47	Greenville.
21	Elliptio dilatatus sterkii	Presque Isle Bay, Lake Erie	.1104	90	Erie, Pa.
13	Elliptio dilatatus sterkii	....	.1320	90	Erie, Pa.
9	Lasmigona costata	French Creek	.0913	127	French Creek.
9	Lasmigona costata	Allegheny River	.0910	61	Parker.
7	Lasmigona costata	Quemahoning.	.0818	50	Kiskiminitas River, analysis.
7	Lasmigona costata	Kelly, Allegheny River	.0399	51.4	Tarentum.
3	Lasmigona costata	Shenango River, Clarksville, Sharpsville	.0963	47	Nearest points, Sharon and and Greenville, greater alkalinity further down stream.

TABLE—*Continued.*

No. Spec. measured.	Genus and Species.	Locality.	m. m. Th.	Parts per million $CaCO_3$.	Stations at which analyses taken with remarks.
3	Lasmigona costata	Shenango River, Harbor Bridge.	.1058	47	
7	Lasmigona costata	Presque Isle Bay, Lake Erie	.0853	90	Erie, Pa.
5	Anodonta grandis	Shenango River.	.0471	47	At nearest points, Anal., Greenville, Sharon.
5	Anodonta grandis	Wolfe Creek, Connoquenessing	.0630	66	Connoquenessing.
5	Anodonta grandis	Presque Isle Bay, Lake Erie	.1039	90	Erie, Pa.
6	Anodontoides ferussacianus	Linesville, Shenango River	.0518	47	Greenville.
6	Anodontoides farussacianus	Greenville, Sharpsville, Shenango River	.0517	47	Sharon.
6	Anodontoides ferussacianus	Presque Isle Bay, Lake Erie	.0550	90	Erie, Pa.
3	Paraptera fragilis	Edgeworth, Ohio River	.0531	61	Pittsburgh.
3	Paraptera fragilis	Beaver, Ohio River	.0500	51	Beaver Falls.
3	Paraptera fragilis	Presque Isle Bay, Lake Erie	.0455	127	Erie, Pa.
4	Proptera alata	Charleroi, Monongahela River	.0825	49	Monongahela.
4	Proptera alata	Neville Island, Ohio River	.1073	61	Pittsburgh.
8	Proptera alata	Allegheny River	.0991	51.4	Tarentum, Analysis.
8	Proptera alata	Ohio River	.1038	61	Pittsburgh.
8	Proptera alata	Presque Isle Bay, Lake Erie	.0848	90	Erie, Pa.
14	Eurynia recta.	French Creek	.1592	61	French Creek.
14	Eurynia recta.	Allegheny River	.1507	59	Parker.
17	Eurynia recta.	Allegheny River	.1621	51.4	Tarentum.
17	Eurynia recta.	Ohio River	.1675	61	Pittsburgh.
14	Eurynia recta.	Presque Isle Bay, Lake Erie	.1239	90	Erie, Pa.
12	Lampsilis luteola	French Creek	.1223	61	Exception, French Creek.
12	Lampsilis luteola	Allegheny River	.1508	61	Parker.
8	Lampsilis luteola	Greenville, Sharpsville, Shenango River	.1275	47	Average, Sharon, Greenville.

TABLE—*Concluded.*

No. Spec. measured.	Genus and Species.	Locality.	m. m. Th.	Parts per millions $CaCO_3$.	Stations at which analyses taken with remarks.
8	Lampsilis luteola	Slippery Rock Creek.	.1185	66	Connoquenessing Creek.
8	Lampsilis luteola	Allegheny River	.1271	51.4	Natrona.
8	Lampsilis luteola	Monongahela River	.163	72	Monongahela.
8	Lampsilis luteola	Ohio River	.163	61	Pittsburgh.
6	Lampsilis luteola	Little Mahoning Creek	.1291	15	Little Mahoning Creek.
6	Lampsilis luteola	Monongahela River	.1606	49	Pittsburgh.
8	Lampsilis luteola rosacea	Presque Isle Bay, Lake Erie	.1171	90	Erie, Pa.
12	Lampsilis luteola rosacea		.1051	70	Erie, Pa.
6	Lampsilis ovata	Mosgrove, Allegheny River	.1049	51.4	Natrona.
6	Lampsilis ovata	Little Mahoning Creek.	.1001	15	Mahoning, Little.
12	Lampsilis ovata	Allegheny River	.1111	51.4	Natrona.
12	Lampsilis ovata	Ohio River	.1151	61	Pittsburgh.
9	Lampsilis ovata	Shenango River.	.1108	47	Average, Sharon, Greenville.
9	Lampsilis ovata	Slippery Rock Creek.	.1016	66	Connoquenessing Creek.
12	Lampsilis ovata canadensis	Presque Isle Bay, Lake Erie	.1038	90	Erie, Pa.
9	Lampsilis ovata canadensis	Presque Isle Bay, Lake Erie	.0909	90	Erie, Pa.

From the table the following conclusion may be drawn, qualified of course by the conditions under which the data is presented:

1. *In all or the majority of cases discussed from the Upper Ohio Drainage, it appears that the thickness of the shell is positively correlated with the percentage of lime in the water.*

2. *In all the cases of the species from Lake Erie, it appears that the thickness of the shell is negatively correlated with the percentage of $CaCO_3$ in the water.*

Why the shells of Lake Erie do not follow the type of correlation obtained for those from the Upper Ohio (should this appear perfectly substantiated), must be largely speculative at present, but the following facts are offered in the light of affecting the ultimate explanation. Walker, (9), has already indicated the general differences between the shells of L. Erie and their parent forms of the Upper Ohio. L. Erie shells are comparatively little eroded, shorter, greater relative degree of inflation, and in some species other characteristics indicating a depauperate type of growth. Certain characteristics of this type are so marked that it has been considered justifiable to assign certain L. Erie shells the rank of varieties (10). Possibly we may recognize the less relative thickness of L. Erie shells as a physiological variation keeping touch with the morphological ones. Dr. Walker in correspondence suggests that these differences as above described may be due to different physical conditions present in L. Erie such as the freedom from disturbance, lower temperature and greater alkalinity of the water. Baker recorded *Cardium* thinnest where the water had the greater saltiness. Comparative and representative analyses of L. Erie and Upper Ohio water show that the former has twice as great alkalinity, and in addition to the greater amount of $CaCO_3$ as already pointed out, a greater proportion of sodium and potassium sulfates, and a large quantity of magnesium carbonate and sulfate which are not reported from the Upper Ohio Drainage. These latter elements occur in sea water to a higher degree than is usually ever reported for fresh water, and their presence may account in the light of the observations I have given, for the effect brackish water seems to have in malforming and depau-

perating shells, although of course in this particular case the excess of $CaCO_3$ itself, may inhibit extended absorption of itself, or this be prevented by the presence of other compounds. In conclusion, I wish to express my obligation to Dr. A. E. Ortmann, on whose material at the Carnegie Museum these observations were made.

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A NEW ALASKAN CHITON.

BY WILLIAM HEALEY DALL.

Schizoplax multicolor n. sp.

Chiton depressed, broad, wider behind than in front, maroon varied with white streaks, with a rather wide girdle, the surface of which is covered with soft bristles like those of *Mopalia muscosa*, among which are sparsely scattered, irregularly disposed, longer translucent spicules; surface of the valves minutely uniformly reticulate under the lens, appearing smooth to the unaided eye; the mesial suture evident, the fifth valve widest, the

posterior valve very small with a subcentral inconspicuous vertex at the anterior third; anterior valve with nine, middle valves with two, posterior valves with two slits, the interior lines of which are marked by a row of minute pores; the middle of the valves on each side of the median suture conspicuously porous internally. Length in alcohol 8, maximum breadth 6 mm. U. S. Nat. Mus. Cat. No. 383018.

St. Paul Island, Bering Sea.

This differs from the type of the genus *S. brandtii* Middendorff in color, form, characters of the girdle and depression of the body; *S. brandtii* has nine slits in the posterior valve which is proportionately larger. If additional specimens confirm its peculiarities, *S. multicolor* may perhaps form a special subdivision of the genus.

A NEW SPECIES OF PYRAMIDULA FROM ALABAMA AND NOTES ON P. CUMBERLANDIANA WITH NEW VARIETIES.

BY GEO. H. CLAPP.

PYRAMIDULA PICTA n. sp. Pl. I, Fig. 4.

Shell thin, the color markings showing through, broadly umbilicate, the umbilicus dome-shaped, exhibiting all of the whorls to the apex and about one-fourth the diameter of the shell; whorls very convex above and below with a sharp *perfectly smooth, white* carina; apex delicately granulated for nearly a complete whorl before the ribs begin to show, first $2\frac{1}{2}$ whorls rounded then a distinct *ribbed* carina is formed and the ribbing continues, getting gradually weaker and finally disappearing on the penultimate whorl. There is a distinct impressed line above the carina on the upper whorls. Ribs weak and almost obsolete on the body whorl. Body color a delicate cream tint with irregular, chocolate-brown blotches which stop at the carina; below a row of squarish blotches immediately below the carina and a second row of narrow flame-like markings extending, faintly, into the umbilicus. Lip thin; aperture very oblique, much wider than high. Whorls 6.

Greater diameter $20\frac{1}{2}$, lesser $18\frac{3}{4}$, altitude 9 mm. Aperture 9×7 mm. Type.

Greater diameter 20, lesser $18\frac{1}{2}$, altitude 10 mm.

Greater diameter 18, lesser 17, altitude 10 mm. A very convex shell.

These shells, over 50 in number, were collected by the late Herbert H. Smith at a place called "Buck Creek Cove" or "No Business Cove," about 3 miles north of Anderson, Franklin Co., Tenn., in 1906. Types No. 7101 of my collection, paratypes in the collections of the Academy of Natural Sciences, Philadelphia, and of Dr. Bryant Walker, Detroit, Mich.

In shape, sculpture and markings, but particularly in the *perfectly smooth* carina, this species stands out from all others of the group; it is the most distinctly marked and richest in coloring of all of the *Pyramidulas.*

P. CUMBERLANDIANA (Lea). Pl. I, Figs. 1. Sewanee, Tenn.

The original description and figure of this species, Trans. Am. Phil. Soc., VIII, 229, pl. VI, fig. 61, are very good and agree exactly with the shells found at Sewanee, Tenn., by Bishop Elliott and later collectors. Lea's original locality was "Cumberland Mountains, near Jasper, Tenn.," which is about 20 miles southeast of Sewanee. I have not seen the type but if, as Dr. Binney says, the Sewanee shells are the same, both Lea and Binney failed to note that the ribs become *much stronger on the carina* giving a saw-tooth effect.

Dr. Binney, Terr. Moll., II, p. 216, gives the size as "Diameter three-fourths of an inch; axis one-fourth of an inch," or about 19×7 mm. W. G. Binney, Manual, p. 258, says: "Greater diameter 15, lesser 13 mm.; height 5 mm." Of 42 shells in my collection, over half of them from Sewanee, and two labeled "E. Tenn. (Elliott-Bland)" from the Redfield collection, the largest run from 16 to 17 mm. diameter. H. H. Smith collected a few typical shells at Paint Rock, Jackson Co., Ala.

At Woodville, Jackson Co., Ala., Mr. H. E. Sargent found a form of *cumberlandiana* with slightly weaker ribs above and below and with the upper whorls less shouldered, but it is hardly

distinct enough to be separated. The largest of the Sargent shells that I have seen measures, gr. diam. 18½, less. 16½, alt. 7 mm., whorls 5¾, umbilicus less than one-third of the diameter of the shell. A single shell collected by H. H. Smith in the same locality measures 19¾ × 8½ mm., whorls 6.

In *cumberlandiana* there is a single row of small, faint, squarish, brown markings just below the carina on the base; in the Woodville shells these spots are larger and much darker. Figs. 2. Woodville, Ala.

P. CUMBERLANDIANA ALABAMA n. var. Pl. I, Figs. 3. Gurley, Ala.

Differs from the type by its larger size, *much finer and flatter ribs* and more convex shape; carina white, sharp, but less pinched than in the type and the ribs on the carina much lower and less accentuated. Ground color lighter than in the Sewanee shells and markings darker. There is a single row of squarish flames just below the carina on the base. Umbilicus about one-fourth the diameter of the shell.

Gr. diam. 21¾, less. 19½, alt. 9½ mm. Aper. 9½ × 8 mm. Whorls 6. Type.

Gr. diam. 21¼, less. 18¾, alt. 10 mm. Aper. 9 × 7 mm. Whorls 6. Huntsville.

Collected by H. H. Smith in 1905 on Vincent Mountain, near Gurley and on Smithers Mountain, 5 miles N. W. of Huntsville, both in Madison Co., Ala. Types No. 7132 of my collection (Gurley) and paratypes in the collections of the Academy of Natural Sciences, Philadelphia, and Dr. Bryant Walker, Detroit, Mich.

P. CUMBERLANDIANA COLUMBA n. var. Pl. I, Fig. 5. Dove, Tenn.

Like the type in sculpture, color and markings, but *not pinched at the carina.* Heavily ribbed above and on the carina, but below the ribs are much finer, about 2.1. There is a single row of chocolate brown, diagonal markings immediately below the carina.

Gr. diam. 18½, less. 16½, alt. 8 mm. Aper. 7½ × 7 mm. Whorls 5.

Near Dove, Marion Co., Tenn., on "East slope of Battle Creek valley among rocks." Collected by H. H. Smith in 1906. Types No. 7100 of my collection, paratypes in collections of the Academy of Natural Sciences, Philadelphia, and Dr. Bryant Walker, Detroit, Mich.

Had this form been found in any other region it might equally well have been considered a variety of *alternata*, but being found in the region of *cumberlandiana* I think it best to make it a variety of that species.

ACHATINELLA HUNTING IN NORTHWESTERN OAHU.

We take the liberty of printing extracts from a letter received some time ago from Mr. Irwin Spalding of Honolulu, in explanation of the interesting photograph of living Achatinellas reproduced on plate II. As a general rule, these snails are found "sleeping" by day, on the under side of a leaf as in the picture, under loose bark, or in a knot hole. They are doubtless active chiefly by night.

Those who have used the monograph in the *Manual of Conchology* know that many species and color-races once abundant are now rare, some doubtless extinct. Dr. Newcomb and Mr. Gulick collected fine tree-shells in quantity where forests are now but a tradition, and their shells are often of color-patterns strange to the modern collector. It is most gratifying to learn that some of these long-lost species are being turned up at higher levels. Mr. Spalding writes as follows:

"So many good things have come my way along the land-shell line these last two months that I really don't know how to begin and tell you all about them. To start in with, I spent my three weeks vacation this year collecting on Oahu, started in at Opaeula and worked around through Waimea, Pupukea, Waialee, Kahuku, Leie, finally landing up at Hauula. Only 2367 *Achatinella* and *Amastra* for the trip, but here is the best of it all, found four of the supposed extinct species, *A. bulimoides; A. emersoni;* typical old-time, banded mottled *A. curta*, and last but not least, *A. ——?;* the latter to be seen in the ac-

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GEO. H. CLAPP: ON PYRAMIDULA

ACHATINELLA ELEGANS NEWC.

companying photograph of six fine adults on a leaf [Plate II]. I will give you six guesses, if you guess their identity I will send you six. As I have hinted more or less where it comes from, I suppose you have guessed correctly at least once out of the six trials, so by bearer you have your shells [they are *Achatinelli elegans* Nc., from Hauula, long supposed to be extinct]. What do you think of that for a find? The first trip netted me 40, second 13, and the last 134, each trip representing as many different ridges. I consider this one of the best land-shell finds of the last dozen years or so.

"*A. bulimoides* is as good as extinct. The first day netted me 7, second day but one. They look very much, as Wilder says, like a reversed *rosea*. The two other species we struck in small colonies, collecting probably a hundred of each.

"I was greatly disappointed in the Waialee district, finding none of the old-timers reported from that section.

"In the fossil bed at Kahuku I found what Montague Cooke claims is a new species of *Amastra*, a form between *Leptachatina* and *Amastra*, small and cylindrical.

"I am glad that you have come to the conclusion that there are too many *Pterodiscus* named from Oahu. It was only a couple of weeks ago that I struck a locality west of Palikea in the Waianae Mts. Not the so-called Palikea where Thaanum found his *heliciformis*, according to the Manual. His locality is Green Peak, marked erroneously on maps as Palikea,—the same place where I found this species some six years ago. Palikea is the high peak northwest of Pohakea gap. Anyway I collected well up to a hundred of a species, samples of which I also send."

TURRITIDAE VS. TURRIDAE.

BY WM. H. DALL.

It is perhaps hardly worth while to spend much more space upon a question of so little real importance as that raised by Mr. Berry, yet as a final contribution I would point out that Prof. Foster admits that Turritidae is correctly formed and criticizes it only from the point of its meaning in classical Latin.

Criticism of meanings in zoological nomenclature has long been given up as hopeless, since zoological Latin is not classical but the colloquial patois of the 18th century.

The form *Turritidae* was the first used and therefore, other things being equal, is entitled to the preference. In the whole of zoological literature, except Adams' Appendix, until lately the Turrii combination does not occur in a single instance, while Scudder gives ten instances of the Turriti form. Even in English we say a castle is turrited and not Turried. *Turritus* means high, lofty or turrited. *Turritidae* is the family of the same. Finis!

LAND SHELLS FROM BEAVER COUNTY, PENNSYLVANIA.

BY E. G. VANATTA.

Mr. James B. Clark collected several packages of leaf mould on the Clydesdale Brick and Stone Company's farm in Beaver County near Ellwood City, about 39 miles north of Pittsburgh, Pa., from which I picked specimens of the species listed below.

The examination of the animal of *Euconulus sterkii* Dall, which is very abundant at this place, revealed a horn upon the tail and tricuspid lateral teeth, proving that this species is a *Guppya*. The microscopic sculpture of the shell is also like that genus.

Polygyra tridentata juxtidens Pils.
Polygyra profunda (Say).
Polygyra denotata (Fer.).
Polygyra pennsylvanica (Gr.).
Polygyra thyroidus (Say).
Polygyra albolabris (Say).
Polygyra zaleta (Binn.).
Polygyra hirsuta (Say).
Gastrocopta contracta (Say).
Columella edentula (Drap.).
Cochlicopa lubrica (Müll).
Haplotrema concava (Say).
Omphalina cuprea Raf.
Mesomphix inornata (Say).
Polita hammonis (Ström.).
Polita indentata (Say).
Paravitrea multidentata (Binn.).
Euconulus chersinus (Say).
Guppya sterkii (Dall).
Zonitoides arborea (Say).
Zonitoides minuscula (Binn.).
Striatura milium (Morse).
Pyramidula alternata (Say).
Gonyodiscus perspectiva (Say).
Punctum pygmæum (Drap.).
Succinea retusa Lea.
Carychium exile Lea.

NOTES.

Dr. Norman MacDowell Grier has been appointed Professor of Biology in Washington and Jefferson College, Washington, Pa.

Dr. Pilsbry and Dr. Bartsch will represent the Academy of Natural Sciences and the National Museum respectively at the Pan-Pacific Scientific Congress to be held in Honolulu in August.

Communications intended for the September Nautilus should be sent to Mr. Johnson in Boston.

Shells from Jamestown, North Dakota.—On June 6th, 1912, I had an hour or two to wait for a train at Jamestown, which I improved by taking a stroll along the banks of "Jim" River in search of mollusks. It is not a likely-looking field for snails as there are only a very few scattering scrubby locust trees along the river banks, but the final count shows ten species, and as one of them is *Gastrocopta holzingeri agna* (Pils. and Van.) it may be well to put it on record, since the only other records for it I am aware of are in Kansas and southeastern Colorado. I am indebted to Mr. Bryant Walker and Dr. V. Sterki who carefully examined the specimens.

Vallonia costata (Müll).
Vallonia perspectiva Sterki.
Gastrocopta armifera (Say).
Gastrocopta holzingeri Sterki.
Gastrocopta h. agna (Pils. & Van.).
Cochlicopa lubrica (Müll).
Vitrea hammonis (Ström).
Pyramidula cronkheitei anthonyi Pils.
Succinea avara Say.
Succinea retusa Lea.—L. E. Daniels.

SEX-CORRELATED COLORATION IN CHITON TUBERCULATUS.[1]—" In adult chitons of this species [in Bermuda] there is noticeable what appears at first sight to be a considerable diversity in the degree to which pigment, of a salmon-pink hue, is developed upon the foot and other soft parts exposed in ventral view. Somewhat less than half of the individuals have the foot, ctenidia, and other soft parts exposed in ventral view. Somewhat less than half of the individuals have the foot, ctenidia, and other soft parts of a pale buff color; in the remainder, the foot, head, ctenidia and mantle are to various degrees tinged with salmon-pink or startlingly vivid. This difference is most pronounced during late spring, but persists to some extent throughout the year. The pigmentation is not correlated in any way with size; individuals of any length from 3.4 to 9.2 cm. may be either pale buff or salmon-pink on the ventral surface, nor does the intensity of reddish pigmentation, when present, depend upon size. In dorsal view it is quite tmpossible to distinguish the two groups of animals, unless the plates be artificially separated to an extreme degree and not even then with any certainty.

" The differential coloration proves to be correlated with sex, in the sense that the soft parts of male chitons are never colored pink whereas those of maturing females invariably are, the intensity of the pigmentation depending to a large extent upon the state of maturity of the ovary, to a lesser extent, it seems probable, upon the quantity and the kind of the algal food available in differing environments.

"The color difference between the sexes of chiton is believed to be of special significance, for the following reasons, because the coloration of the soft parts of the female is directly traceable to metabolic activities associated with the growth of the ovary, and because it provides an example of secondary sexual coloration which has no conceivable utility, but is, on the contrary, so far as color is concerned, of a thoroughly accidental nature."
—W. J. CROZIER.

DYER ISLAND, BERMUDA.

[1] Extracts from a more extended discussion under this title in The American Naturalist, Jan.-Feb., 1920, pp. 84–88.

SHELLS OF ORLANDO, FLORIDA.—The following notes are from a letter received from Mr. C. H. Baker (July 21, 1915) of Orlando, Florida. As this is all the shells he could find in several years collecting near Orlando and Zellwood, Florida, it was thought advisable to put them on record.

In the original description of *Praticolella bakeri* Van., an A. was printed in Mr. Baker's name in place of an H. by mistake.

Specimens taken were mostly along shores of some large connected lakes or head of Ocklawaha R.

Praticolella bakeri Van. Proc. Acad. Nat. Sci., Philada., 1915, p. 196.

Praticolella jejuna Say.

Polygyra auriculata Say. Found but once and in one locality, several specimens. Not seen at all for five years or upwards.

Polygyra uvulifera Shutt.

Euglandina rosea Fer. No perfect specimens taken, pretty widely distributed but not common, quite elegant.

Planorbis duryi Weth. Frequent, and well distributed.

Planorbis scalaris Jay. Frequent, varying almost to the preceding.

Ampullaria depressa Say. Relatively large, handsome species, varying a good deal in coloring, common.

Viviparus waltoni Try. Our most abundant species, seldom found in original "mint" condition, varying much in coloring, somewhat handsome. Large mounds exist composed almost entirely of this shell (sepulchral mounds along inland waterways).

Gillia wetherbyi Dall. Quite rare, took but 1.

Unio buckleyi Lea. Quite generally distributed.

Anodonta gibbosa Say. Also common.—E. G. VANATTA.

PUBLICATIONS RECEIVED.

ON THE RELATIONS OF THE SECTIONAL GROUPS OF BULIMULUS OF THE SUBGENUS NAESIOTUS ALBERS. By William Healey Dall (Journ. Wash. Acad. Sci. X, No. 5, March 4, 1920). By cutting sections various differences in the axis were found, simple,

twisted or having internal nodules, etc. Combined with the external characters, a grouping into 14 sections is indicated. Dr. Dall believes that nothing in the land-shell fauna of the Galapagos group, which these snails inhabit, lends weight to the hypothesis that these islands were ever connected by land with the continent of South America. The snails "were probably transported originally to the Galapagos group by high winds while attached in a state of hibernation to dead leaves or similar light material."—H. A. P.

FAUNA OF THE HAMPDEN BEDS AND CLASSIFICATION OF THE OAMARU SYSTEM. By P. Marshall (Trans. and Proc. N. Zealand Inst., 1919, Vol. 51, pp. 226–250, pls. 15–17). Twenty-seven new fossil mollusks are described.

SOME NEW FOSSIL SPECIES OF MOLLUSCA. By P. Marshall and R. Murdoch (Trans. and Proc. N. Zealand Inst., 1919, Vol. 51, pp. 253–258, pls. 19–21). Nine new species are described.

MOLLUSCA FROM CENTRAL AMERICA AND MEXICO. By Henry A. Pilsbry (Proc. A. N. S., Phila., 1919, pp. 212–223). 16 new species and several subspecies, mainly collected by Mr. A. A. Hinkley. The more interesting forms are *Averellia* (*Trichodiscina*) *hinkleyi* and a form of *Neritilia*, a genus new to the American mainland, found in Guatemala by Mr. Hinkley.

A MONOGRAPH OF THE NAIADES OF PENNSYLVANIA, PART III. By A. E. Ortmann, Mem. Carnegie Museum, Vol. LI, No. 1, 1919.

This sumptious volume is a fitting envelope for its contents. Indeed the most serious criticism to be made is that it is too luxurious for convenient use, as the weight of the paper used makes the book too heavy to be held in the hand for reading, and necessitates the use of a table or reading desk when consulting it.

Beyond question this is the most philosophical and comprehensive study of the Naiad fauna of this country (or any other, for that matter) that has yet appeared. The elaborate compilation of all the records of the Pennsylvania fauna supplemented by the extensive and intensive collections made by the author leave but little to be added by later investigations, and the wealth of anatomical and ecological details will be a revelation to those who have not kept *au courant* with the trend of modern methods of scientific research. The excellent keys of both generic and specific characters add much to the practical value of the paper to the student.

In addition to the details of local distribution, the author has supplied complete summaries of the general distribution of each of the species treated so far as given in the literature, supplemented by the material in the Carnegie Museum; and his comments thereon at once reveal the inadequacy of our present knowledge to furnish a proper basis for an accurate and truly scientific study of the fundamental facts of the origin and distribution of the Naiad fauna of the country and raise many pertinent questions, which can not well be touched upon in this review, but which will undoubtedly excite discussion and increase the interest of American students in their local faunas.

This study of the fauna of Pennsylvania will be a model for others to imitate for many years to come.

The Naiad fauna of Pennsylvania as recognized by the author includes 58 species and 21 varieties. Of these seven species belong to the Atlantic fauna and two species and one variety, while characteristic of the Atlantic drainage, are clearly derivatives from western species. The remainder belong to the Mississippian fauna of Simpson.

The systematic arrangement of the various groups represented in the fauna is that which has been elaborated by the author in previous papers and represents the modern tendency to multiply genera. How far this is really advisable is a subject for serious consideration as practically the same results, so far as systematics are concerned, can be obtained the use of subgenera, which will sufficiently indicate the differences, while retaining not only the familiar names, but also the larger relationships,

which are apt to be lost sight of in the excessive elaboration of comparatively minor details into generic characters. (See Stone, Science, LI, pp. 427–429, 1920.)

The specific nomenclature adopted is that of the ultra-Rafinesque school and results in the changing of about one-fourth of the names in current use. But the last word has not yet been said in regard to Rafinesque's species. Indeed more than a year ago the author and the present writer undertook to make a careful study of the subject in accordance with the requirements of the International Code of Nomenclature, which is now about ready for publication and which it is hoped will go far towards definitely settling the nomenclature of the North American Naiades.

Barring the question of specific names there is much to praise and but little to criticize in the synonymy adopted.

It is possible that some of the conclusions reached by the author and based, perhaps, too much on local conditions may be subject to revision when an equally detailed study of the species throughout their entire range can be made.

The question of possible hybridization between closely allied species along the line of contact, when elsewhere the specific characters seem to be fixed is one that must necessarily be taken into consideration.

The author lays great stress upon his theory that small streams tend to produce a small, flat form which increases in size and rotundity as the river grows larger. While this is apparently true in many cases, there are exceptions, some of which are noted by the author. *Amblema elliotti* Lea is another notable one. The large, typical form from Othcalooga Creek, a small stream, is much larger than any *Amblema* from the Coosa. On the other hand, practically all of the species of the Great Lakes are dwarfed and much smaller than the same species from the comparatively smaller tributaries. It would seem that possibly other factors, such as temperature, food supply, chemical constituents of the water and other ecological conditions and not simply the size of the stream should be taken into consideration.

But all these are comparatively minor matters which do not detract from the worth of the monograph as a whole and which

will serve their purpose if they stimulate discussion and research.

Both the author and the Carnegie Museum are to be congratulated upon such a notable contribution to scientific literature. —Bryant Walker.

Onchidiidae from Australia and the Southwestern Pacific Islands. By Rex W. Bretnall (Records of the Australian Museum, Vol. XII [Oct., 1919], pp. 303–323, pl. 38). An exhaustive systematic paper dealing largely with the anatomy of the various species.

A Review of the Australian Tun Shells. By Charles Hedley (Records Australian Museum, Vol. XII, pp. 329–336, pls. 39–44). An interesting review of these large shells. Two new species, *Tonna cerevisina* (*T. variegata* Hedley not Lamarck) and *T. tetracotula* are described and figured.

Notes on Iceland Marine Mollusca. By Hans Schlesch (Naturalist, Jan., 1920, pp. 19 and 20). This paper is based on notes from Gunmunder G. Bardarson's "Mollusca marina Islandiae" (Scientific Society of Iceland, 1919).

The Journal of Conchology, Vol. 16, No. 3, Jan., 1920.

List of officers and members, pp. 69–76.

Note on Cypraea bernardinae Preston, p. 76. By J. C. Melvill (= *C. lamarckii* var. *redimita*).

Reminiscences and practical hints on collecting. By E. Collier, pp. 77–85.

Brachypodella nidicostata nov. sp. from Venezuela. By Geo. C. Spence, p. 86.

Four new marine species from South Africa. By J. R. Le B. Tomlin, pp. 87–88.

The marine Mollusca from Sussex. By R. Winckworth, pp. 89–95.

Succinea oblonga Drapanaud. By Alan Gardiner, p. 95.

Notes on the Anatomy and Reproduction of Paludestrina stagnalis. By Capt. H. E. Quick, pp. 96–97.

Parthenogenesis in Paludestrina jenkinsi from brackish water. By H. E. Quick, p. 97.

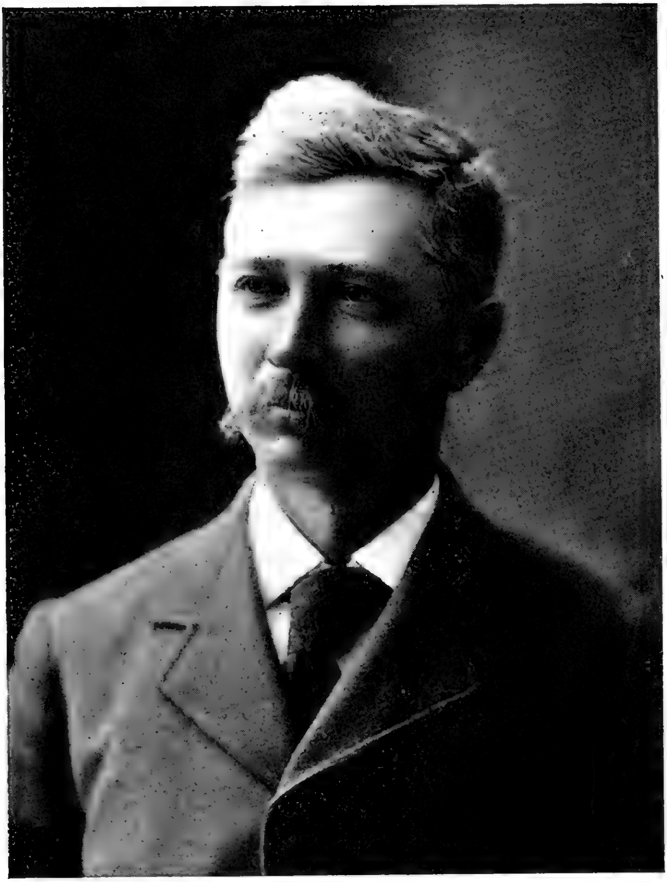
JOURNAL DE CONCHYLIOLOGIE, Vol. 64, No. 3, Oct., 1919.
Monographie illustree des Mollusques Oligoceniques des environs de Rennes, par M. Cossmann, pp. 133–199, pls. 4–7. –C. W. J.

THIRTY-FIRST YEAR OF THE NAUTILUS.

The April number completed the thirtieth year of THE NAUTILUS under the present editors. That it has had sufficient encouragement and support to live so long may fairly be taken to mean that the American conchologists have found it stimulating and useful. When the quarterly issue was begun the editors had anticipated increasing the number of pages and illustrations; but for the present THE NAUTILUS is content to hold its own against the rising tide of expense in printing and paper, by the cordial help of the conchological fraternity.

It is your magazine. We trust that in this thirty-first year every one interested in mollusks will coöperate in making it more interesting and a greater stimulus to collecting and study. Contributions of articles, illustrations, notes and news items both personal and scientific will be needed; and by no means least, subscriptions.

H. A. PILSBRY,
C. W. JOHNSON.



ANSON A. HINKLEY

THE NAUTILUS.

Vol. XXXIV OCTOBER, 1920. No. 2

GUATEMALA MOLLUSCA.

BY A. A. HINKLEY.

This list is the result of three vacation trips. For the determinations I am indebted to Dr. H. A. Pilsbry, Dr. Bryant Walker, Dr. V. Sterki, Dr. Wm. H. Dall and others of the National Museum and Prof. F. C. Baker of the Illinois University.

For accommodations and personal comfort much is due to the kindness of Mr. Landry, Supt. of the United Fruit Companies' plantations at Quirigua. To Mrs. Lucie Potts, Proprietress of the Jocolo plantation. To Mr. and Mrs. Robert Hempstead of the Chejel and Chama coffee plantations and to others for their various acts of kindness. The list is arranged by localities.

LAKE AMATITLAN is some 20 miles south of Guatemala City; it is two lakes connected by a short strait across which the railroad embankment has been built. Laguna Station is on the south or southwest of the lake, just across the strait.

Pachycheilus lacustris (Morelet) is plentiful in the shallow water of the lake. The largest were found among rushes some 40 feet from a hot spring. Egg masses of this mollusk were numerous, much like those of *Physa* but larger. The fresh masses were clear, changing to yellowish as the young were about to emerge. Some were seen breaking through.

Amnicola guatemalensis Walker. Taken near the edge of the water or on driftwood and pumice. Another species of *Amnicola* was taken with the above.

Potamopyrgus coronatus (Pfeiffer). Taken from a muddy bottom in a sheltered place near a building. Many are smooth with a dark line in place of the row of spines.

ACROSS THE LAKE FROM LAGUNA were a number of dried-up pools on the railroad right-of-way, which contained dead specimens of the following species:

Succinea recisa (Morelet).

Aplexa fuliginea (Morelet).

Aplexa tappanensis guatemalensis (Crosse & Fischer).

Planorbis orbiculus (Morelet).

Planorbis cultratus (D'Orbigny).

Planorbis sp.?

Planorbula obstructa (Morelet) var. *anodonta* (Pilsbry).

Soon after passing out of the east gate of Guatemala City, the road descends into a deep ravine with a creek at the bottom; here the only species was *Aplexa fuliginea* (Morelet); it was also taken in the basins of fountains in the city.

OUT OF THE NORTH GATE the road is bordered by a row of large cedar trees on either side for a half-mile or more, to a cedar grove, then to the edge of a deep ravine where the road-bed is cut out of the high, irregular, precipitous slope until a much lower level is reached, and the road soon ends at the tapia baths. Farther down the canyon can be seen the reservoir. In the cedar grove were found:

Drymæus alternans (Beck).

Drymæus jonasi (Pfr.).

Helicina sp.? One specimen.

Pachycheilus largillierti (Philippi). Immature specimens were very numerous in the large pool, the individual rooms and the stream. The only mature specimen found was dead and bleached. From the reservoir were taken:

Pseudosuccinea championi (Von Martens). One specimen only.

Aplexa fuliginea (Morelet).

Physa sp. Varies from smooth to costate forms.

Planorbis caribæus Orb.

Segmentina obstructa (Morelet), var. *anodonta* (Pilsbry).

Gundlachia hinkleyi Walker.

Lævapex excentricus (Morelet).

Amnicola cisternina (Walker).

Amnicola hinkleyi (Walker).

Potamopyrgus coronatus (Pfr.).

Pisidium sp.? "They appear to be of the same group with a Pisidium from Chili, that is closely related to *Pisidium sterkianum* from Uruguay; same shape and appearance, but somewhat smaller."

Pseudohyalina maya Pils.

Thysanophora dioscoricola (C. B. Adams)? One poor specimen taken from the washings when collecting the Amnicola.

MAYA FARM, QUIRIGUA, a short distance from the Farm Overseer's quarters, are the interesting "Quirigua Ruins", a good description of which appeared in the *National Geographic Magazine* some years ago. On this farm were found:

Aperostoma dysoni (Pfeiffer).

Helicina amoena Pfeiffer. Under and about decaying vegetation.

Helicina flavida Mke. or *trossula* (Morel. The identity of the original *H. flavida* seems to be in doubt.

Thysanophora plagioptycha (Shutt.). One specimen.

Oxystyla princeps (Brod.). Two live ones taken from banana plants; dead ones scarce.

Gastrocopta pentodon (Say). Under chips, scarce.

Opeas beckianum (Pfr.).

Opeas micra (Orb.). One specimen.

Cæcilioides consobrina veracruzensis (Crosse and Fischer).

Leptinaria guatemalensis Crosse and Fischer.

Euglandina decussata (Desh.). About old logs, under loose bark and other vegetation. A fine species.

Guppya elegantula Pilsbry.

Guppya grundlachi (Pfr.).

Zonitoides minusculus (Binney).

Zonitoides elegantula (Pfr.). Under chips.

Ammoniceras stolli (Martens). Under chips. Only one specimen, rare.

Leptinaria livingstonensis Hinkley.

Streptostyla turgidula (Pfr.) var. *producta* Pilsbry. One specimen.

Succinea recisa Morelet.

Aplexa impluviata laeta Martens. Appeared to be feeding on banana leaves which had been thrown into the pool.

Planorbula obstructa anodonta (Pilsbry). Conchens river.

Laevapex excentricus (Morelet). Pools by the railroad.

Gundlachia hinkleyi Walker. With the above.

Potamopyrgus coronata (Pfr.). Rio Conchens.

Amnicola conchensensis Walker. Rio Conchens.

Ampullaria flagellata lattrei C. & F. On banana leaves and cull bunches of bananas which had been thrown away.

Mycetopoda sp. Rio Conchens. This mollusk burrows head down until the posterior part is just above the bed of the stream; the foot is extended nearly the width of the shell farther down in the soil. When removing the first one found a strong pull tore the foot from the shell.

Nephronaias ortmanni Frierson. Plentiful in Rio Conchens; in one place several hundred were massed together.

Glabaris depexa (Martens). With the above; only one found.

Pisidium guatemalensis (Sterki). Rio Conchens. Sterki says: "Has a hinge of unique formation; width 5, height 4, diam. 3 mm."; fragile.

Pisidium sp. With the above. Sterki says: "Although of the same size and the same appearance, they are evidently distinct from *Pisidium singleyi* (Sterki). Of the same group, same shape and appearance with a *Pisidium* from Barbados; unnamed, so far as I know."

Eupera yucatanensis minima (Pilsbry). Rio Conchens, scarce.

LIVINGSTON. Beach and beach drift.

Polygyra helictomphala (Pfr.). Only one specimen.

Streptostyla ligulata (Morelet). "A very rare species"; the only one found was at the edge of vegetation growth.

Helicina flavida (Mke.) or *H. trossula* (Morelet).

Helicina coccinostoma Morelet. First determination was *H. oweniana*.

Helicina sp. More depressed than any other Helicina found except *H. amœna*.

Lucidella lirata (Pfr.).

Truncatella sp. Two specimens.

Cochliopa minor Pilsbry.

Spirula spirula (Linn.). Plentiful in 1914, scarce in 1917.

Thais coronata var. On rocks beyond Cavech village and on piling and breakwater at Puerto Barrios.

Melongena melongena (Linn.). In shallow water. Donax seemed a favorite food for this mollusk.

Strombus pugilis (Linn.). A few dead ones near Cavech village.

Epitonium lineatum (Say). One small specimen.

Cæcum sp. One specimen.

Littorina nebulosa Lam. On rocks and drift logs; common.

Littorina carinata Orb. Young were very numerous on a perpendicular rock; many were beyond reach of the spray from the ordinary waves.

Litiopa melanostoma (Rang).

Nerita fulgurata (Gmel.). Beyond Cavech village, on rocks out of the water at low tide.

Neritina punctulata Lam. In Cavech river on rocks near the limit of high tide. Often these shells were nearly covered with small oval cases (of an insect?).

Neritina listeri Pfr. Close to *N. virginea*, only larger.

Neritina virginea (Linn.). Numerous on the muddy banks of Cavech river, covered with water at high tide, very plentiful on the pebbly beach of Rio Dulce.

Neritina lineata reticulata (C. & F.). In thick swampy woods near the beach.

Neritilia succinea guatemalensis (Pilsbry). Just above high tide in a clear pool of Cavech river; with them were a few young *N. virginea*.

Cylichnella bidentata (Say). Two specimens.

Haminea solitaria (Say). One specimen.

Tagelus poeyi Dall.

Mulinia guadelupensis (Recl.).

Strigilla pisiformis (Linn). Common on the beach, but both valves together were scarce.

Strigilla flexuosa (Say). Much like *S. pisiformis;* has not the red coloring of that species.

Macoma constricta (Brug.).

Donax striata (Linn.).

Donax striata mediamericana (Pilsbry). A small form of *striata.* Dead shells were more numerous than the live ones, or so appeared.

Tivela mactroides (Born). The most common species on the beach; no live ones seen and both valves together were very scarce.

Cyrena solida Phil. Plentiful in Rio Dulce, most mature ones badly eroded.

Cyrenoidea guatemalensis Pilsbry. In 1914 one specimen taken near the mouth of Cavech river.

Mytilus exustus (Linn.). In masses on rocks and drift logs and under the bluff of the projecting point of land, mostly immature.

Mytilopsis sallei (Recluz). Often with *M. exustus.*

Across the Rio Dulce from Livingston, on the first mountain or foothill, is Rio Blanco, a small stream in which were found:

Nephronaias calamitarum (Morelet).

Pachycheilus pyramidalis (Morelet). Mostly immature.

Pachycheilus indiorum (Morelet).

Pachycheilus corvinus (Morelet) and the color variety *lutescens* C. & F.

Helicina rostrata Morelet. On top of the hill one broken, nearly fresh specimen was found. The writer has three specimen received from Thomas Bland many years ago.

A short distance west of Livingston were found:

Aperostoma dysoni (Pfr.).

Amphicyclotus bisinuatus (Martens). Dead specimens.

Chondropoma rubicundum (Morelet). Scarce.

Subulina octona (Chem.). Very plentiful by the side of side streets and paths among decaying vegetation and filth; also found on the hillside in front of the hotel, with *Leptinaria livingstonensis.*

Oxystyla princeps (Brod.). Bones only.

Leptinaria livingstonensis (Hinkley). In front of the hotel, on the hillside.

Brachypodella subtilis pulchella (Martens). On stones nearly buried in the soil.

Averellia hinkleyi (Pilsbry). One bone.

Pachycheilus pyramidalis (Morelet). A creek where it is crossed by the telegraph line. A few fossils were taken at this place.

Neritina listeri (Pfr.). Same place as above.

MOUNTAINS OF RIO CAVECH and those back of Cavech village. These are listed together, although there is some distance between. The village is a little farther up the coast than the mouth of the river, the stream having a course oblique with the coast. The mountains or hills of this region are often steeply sloped and covered with thick timber, which keeps down the undergrowth in a great measure, so one can climb without much interference from that source. These limestone hills have many small crevices or openings, affording protection to different kinds of animal life besides mollusks.

Cœlocentrum gigas Martens. More plentiful back of the village than elsewhere. See NAUTILUS, Vol. 33, page 79.

Cœlocentrum fistula (Morelet). One specimen.

Euglandina decussata (Desh.). None living.

Euglandina monilifera (Pfr.). Bones.

Guppya gundlachi (Pfr.). Scarce.

Averellia hinkleyi (Pilsbry). Only bones.

Leptarionta trigonostoma (Pfr.). Dead specimens and fragments.

Drymæus sulphureus (Pfr.). Dead specimens and fragments.

Streptostyla delibuta (Morelet).

Streptostyla lattrei (Pfr.). Bones; a fine and well-marked species.

Streptostyla schneideri (Strebel).

Streptostyla turgidula producta (Pilsbry).

Opeas beckianum (Pfr.).

Opeas pumilum (Pfr.).

Subulina octona (Chem.). A mile or more back of the village, by a well-traveled path.

Pseudosubulina martensiana Pilsbry.

Leptinaria guatemalensis Crosse and Fischer.

Leptinaria livingstonensis Hinkley.

Spiraxis livingstonensis Pilsbry.

Spiraxis longior Pilsbry.

Brachypodella subtilis pulchella (Martens). Of the same color as the limestone on which they live, they are inconspicuous. The shell hangs parallel with the face of the rock or stands out at an angle.

Bothriopupa breviconus Pilsbry. One specimen.

Cæcilioides consobrina veracruzensis (C. & F.).

Helicina amoena Pfr.

Helicina flavida Mke. or *H. trossula* Morelet.

Helicina coccinostoma Morelet.

Cistula radiosum (Morelet). Found on limestone and dead wood, sometimes hanging by a thread. Some were in motion, but the larger part were attached to the rock or wood of similar color.

Chondropoma rubicundum (Morelet). Situated above fallen trees, base of rocks and under old banana leaves. Some variation in size.

Pachychilus indiorum (Morelet). Cavech river. This species prefers shallow water. The finest specimens were on a hillside in thick timber where the water spreads out thin over a flat rock surface marked with irregular seams and depressions; many of these mollusks were barely wet, hundreds of the shells with a mottled and polished surface showing through a thin film of water made an attractive sight to any one interested in the beautiful of Nature.

Pachychilus corvinus (Morelet). This mollusk prefers more water than the above. At this locality there is more color variation, from a dark purple to the almost white form known as variety *lutescens*.

Pachychilus largilierti (Philippi). In a small stream, almost dry, they had collected by the thousands, in small pools, many dead and the rest dying. Nearly all were immature. A few of the largest were taken.

PLANTERA, a banana plantation several miles up Rio Dulce from Livingston. For the first few miles the river is picturesque, passing between steep high hills covered with dense vegetation of varying shades of green. Sometimes the slope is broken by an abrupt face of rock. On one such face, larger than the rest, were many obscure figures and markings, in lines of lighter color, said to be drawings of an unknown race of people. The appearance was more like the marks from seepage water carrying lime.

Pachychilus largillierti (Philippi). Only a few specimens found in a small river which was followed for some four miles.

Ampullaria flagellata tristrami C. & F. In a small swamp near the Plantation buildings.

Neritina lineata reticulata (C. & F.). With the above.

Subulina octona (Chem.). A few in the yard under some loose stone.

ESMERALDA. This plantation is on the left bank of Rio Dulce some three miles below the old Fort San Felipe, now in ruins.

Guppya gundlachi (Pfr.). Fragments seen along the trail to Rio Saja.

Opeas micra (Orb.). Under trash in front of a hut.

Opeas pumilum (Pfr.). With the above.

Cæcilioides consobrina veracruzensis (C. & F.). Same as above.

Succinea recisa (Morelet) or *S. guatemalensis*. With above. These are too young to decide to which species they belong with certainty.

Helicina amoena Pfr.

Amphicyclotus bisinuatus (Martens). Two bones.

Ampullaria flagellata tristrami C. & F. On the border of the river among water plants and under drift lodgments.

Pachychilus glaphyrus (Morelet). These are between *immanis* and the *obeliscus* of the lake. Numerous on the border of the river.

Pachychilus pyramidalis (Morelet). Some fine large specimens were found in Rio Saja, under drift and other places protected from the force of the current.

Nephronaias dysoni (Lea). Found with the above. They were always more or less eroded, a good species. This stream is some five miles west of Esmeralda and the above two species were the only ones found there.

Potamopyrgus coronatus nicaraguanus (Ancey). Plentiful in small bays or recesses of the river.

Cochliopa dulcensis Marshall. Common with the other small species taken with a net.

Cochliopa izabal Pilsbry. Common.

Neritina lineata reticulata C. & F.

Neritina listeri Pfr. Both these Neritina were scarce.

Planorbis caloderma Pilsbry. A small species, little larger than *Segmentina obstructa,* with more tumid whorls.

Cyrenoides guatemalensis Pilsbry. One specimen.

Mytilopsis sallei (Recluz). Numerous, on sticks and stones, often in clusters of many individuals.

Jocolo. This plantation, on the north side of Lake Isabal, is owned and operated by Mrs. Potts, a hospitable lady. The commodious residence among palm and citrus trees is picturesque viewed from the small wharf projecting into the lake. The lake is bordered by rushes, with here and there small open beaches of sand. On a point some distance above the wharf was a windrow of fine drift, thrown up by a strong wind; this was the only place where drift was found. It evidently came down a river near by. This proved quite rich in number of species, but specimens were scattering. The entire windrow was worked over. The region has numerous small streams with beds of rock, gravel and sand, with soft mud where they enter the lake.

Nephronaias guatemalanus (von Martens). A few specimens referred to this were found in the lake with *N. ravistellus.* It is some higher and lighter colored than that species.

Nephronaias ravistellus (Morelet). Common. In 1914 they were found mostly in water two to four feet deep, but in 1917 they were plentiful among the rushes and on the sandy beach up to the water's edge.

Nephronaias tabascoensis (Küster). Mrs. Potts gave the writer a few found by a native.

Ampullaria flagellata tristrami C. & F. Marshy places and along the border of the lake, among the rushes on which the white egg-masses were quite numerous a little above the surface of the water.

Ampullaria flagellata lattrei C. & F. On rocks near San Felipe.

Pachychilus glaphyrus immanis (Morelet). Common on the soft mud at the mouth of the streams.

Pachychilus glaphyrus obeliscus (Morelet). The most plentiful *Pachychilus* in the lake. They are more attenuate and smaller than the closely related *immanis.*

Pachychilus lacustris (Morelet). These appear more like a smoother form of *P. obeliscus,* and do not agree with *P. lacustris* from Lake Amatitlan, from which they differ in fewer and flatter whorls, and the suture not as deep.

Pachychilus pyramidalis (Morelet). Plentiful in clear streams, often concealed in lodgments of brush and leaves. On account of its size and clean living it is preferred for food. They are cooked in stews or soups, croquettes, or roasted. The species often reaches three inches in length.

Pachychilus pottsianus n. s. Found only on two hillsides back of Jocolo.

Potamopyrgus coronatus nicaraguanus Ancey. Plentiful; varies from a smooth shell to one with strong striations and prominent spines.

Cochliopa dulcensis Marshall. With the following two species.

Cochliopa hinkleyi Pilsbry. This small flat species of a size that evidently washed through the net in numbers when taking the other small species.

Cochliopa izabal Pilsbry. Common, has some resemblance to *C. guatemalensis.*

Cochliopa izabal Pilsbry, mutation *peristriata* Pilsbry.

Hemisinus ruginosus (Morelet). Common in places on the lake shore. In 1914 one immature specimen was all that was found. In 1917 the first were taken in the net with *Cochliopa,* etc. Later while picking up *Nephronaias* they were noticed among numerous *Pachychilus* and could easily have been passed as the young of that genus. Their trail was made by burrowing instead of crawling on the surface as with other forms.

They burrowed somewhat like a mole, and often the little mole-like ridge could be followed quite a distance, and the mollusk found working under cover.

It is a viviparous genus. When cleaning these shells the embryos run from one to three to the individual. None were noticed with more than three.

Planorbis caloderma Pilsbry. Only three specimens taken in the net with the small forms.

Planorbis caribaeus (Orb). One small specimen with the above.

Ancylus sp. Taken in the net.

Euglandina decussata (Desh.). All dead but one.

Euglandina monilifera (Pfr.). One alive, found in the banana field under dead leaves.

Salasiella guatemalensis Pilsbry. Under leaves and trash.

Guppya elegantula Pilsbry. Lake drift.

Guppya gundlachi Pfr. Lake drift.

Zonitoides minusculus (Binney). Lake drift.

Averellia hinkleyi Pilsbry.

Thysanophora plagioptycha (Shutt.). Lake drift.

Strobilops strebeli guatemalensis n. subsp.

Bulimulus corneus (Sowb.). Found in a banana field under dead leaves.

Drymaeus sulphureus (Pfr.). Bones.

Oxystyla princeps (Brod). Dead.

Opeas beckianum (Pfr.). Lake drift.

Opeas micra (Orb.). Lake drift.

Opeas pumilum (Pfr.). Lake drift.

Subulina octona (Chem.).

Leptinaria guatemalensis C. & F. Lake drift.

Leptinaria livingstonensis Hinkley. In the fields back of Jocolo.

Caecilioides consobrina veracruzensis (C. & F.). Lake drift.

Gastrocopta pentodon (Say). Lake drift.

Succinea recisa Morelet. Banana fields.

Aperostoma dysoni (Pfr.). Under decaying leaves in the banana fields.

Amphicyclotus bisinuatus (Martens). Scarce.

Helicina amoena Pfr.
Helicina tenuis var. *lindoni* Pfr.
Helicina flavida Mke. or *H. trossula* Morelet.
Helicina coccinostoma Morelet.
Lucidella lirata (Pfr.). Lake drift.

PANZOS, State of Alta Verapaz. The head of navigation on the Polochic River. No land species found here, although a half day was spent on a stroll up the R. R. to a good-sized creek which was followed for some distance and the return made over the mountain, with no results whatever.

Ampullaria flagellata tristrami C. & F. Two good large specimens, dead, found in a marshy place near the R. R.

Pachychilus pyramidalis (Morelet). Young specimens plentiful in a creek near the town.

Pachychilus indiorum (Morelet). A few specimens taken with the above.

Amnicola panzosensis Walker. From a pool formed by a small stream from a spring or seepage on the mountain side.

Pisidium singleyi Sterki. With the above *Amnicola*.

CHEJEL, State of Alta Verapaz. At the end of the R. R. the writer was met by a guide and horses sent by Mr. Robert Hempstead, and was conducted to his residence on the Chejel coffee plantation. A nice home on the side of the mountain, some 2000 ft. elevation, with roses, violets and other flowers in the front yard. From the veranda on the other side of the house the mountain side is a steep slope to the base where it meets the base of the next mountain. An extensive mountain view in all directions is seen from this veranda.

Pachychilus indiorum (Morelet). Mr. Hempstead kindly showed me the spring from which we picked up a few specimens of this species. These are lighter-colored and do not show the mottled color of those from the Cavech. This was the only species found at Chejel.

Pachychilus corvinus (Morelet). Immature specimens I took for this species from a rill that crosses the road on the way to Purulha.

Trichodiscina sargi (Crosse & Fischer). One specimen found in a damp, shaded place at the base of a rock bank near the above rill. This appeared to be an ideal place for mollusks, but a half-hour's search produced nothing more.

Drymaeus castus (Pfr.). On the road to Puruhla one fair specimen a little broken and other fragments evidently dropped by birds were all noticed.

Streptostyla nigricans (Pfr.). One immature specimen.

Nothing was found from Puruhla to Tactic.

Tactic. Half way between Pancojchl and Coban.

Pachychilus corvinus (Morelet). Plentiful in two creeks, one north of town and the other in the south edge of the town.

Physa sp. A few quite young noticed in a pool by the road to Coban.

On the road between Coban and Chama.

Euglandina decussata (Desh.). A larger form than those found nearer the coast; dead specimens only.

Pseudosubulina mitescens Martens.

Epirobia polygyrella (Martens). On rock faces exposed to the north.

Eucalodium decollatum (Nyst.). A subspecies. Dr. Pilsbry says "I have never seen this form before." One dead specimen. There were also specimens a little smaller and thinner than the above covered with fine oblique striae extending from suture to suture.

Amphicyclotus boucardi (Pfr.).

Pachychilus graphium (Morelet) var. *transcendens* C. & F. Picked up by the road; probably dropped or thrown aside by some one.

Chama, State of Alta Verapaz. This plantation of coffee, cacao and rubber is in the mountains near Rio Tsalbha and probably half a mile or more from Rio Negro. It is about 900 feet above the sea and the river is 50 ft. lower.

Ampullaria lattrei chamana n. subsp. Four live specimens were brought to the writer by an Indian.

Pachychilus pyramidalis (Morelet). Some distance up Tsalbha River from Chama.

Pachychilus corvinus (Morelet). A few specimens.

Pachychilus hinkleyi Marshall. Many dead ones, but few living. The water was too high to get the living in the swift current.

Pachychilus cinereus (Morelet). Only found in a creek. Probably a peck of these shells were in an old pot saved to burn for lime by Indians. These shells were all more or less mutilated in preparing them to cook.

Physa sp. Two fine specimens taken in a drainage ditch in the Cacao orchard. They have a colored band at different stages of growth as in *P. gyrina*, the transverse striae are irregular, the fine revolving striae are not as distinct as in *P. gyrina*.

Psoronaias kuxensis Frierson. A small stream at Chama, in sheltered places among the rocks on the bed of the stream, many eroded.

Euglandina decussata (Desh.).

Euglandina monilifera (Pfr.). Bluff on the mountain north of Chama.

Streptostyla delibuta (Morelet). Bluff.

Streptostyla lattrei (Pfr.). Bluff.

Streptostyla sargi Crosse & Fischer. Bluff.

Streptostyla sololensis C. & F. Bluff.

Streptostyla turgidula producta Pilsbry. Bluff.

Salasiella sp. Somewhat like *S. hinkleyi*, but the second whorl is much longer; one dead specimen from the bluff.

Salasiella sp. "Cannot refer to any known species" from the bluff.

Ammoniceras stolli (Martens). Three immature specimens in a clearing back of the plantation buildings.

Zonitoides minusculus (Binney). River drift.

Zonitoides elegantula (Pfr.). River drift.

Pseudohyalina puncticipitis Pilsbry. River drift.

Guppya elegantula Pilsbry. River drift.

Guppya gundlachti (Pfr.). River drift.

Lysinoe ghiesbreghti (Pfr.). From the bluff, one very young example.

Drymaeus sulphureus (Pfr.). Bones.

Coelocentrum fistulare (Pfr.). Variety from the bluff north of Chama.

Macroceramus concisus (Morelet). From the bluff.

Opeas beckianum (Pfr.). From the bluff.

Pseudosubulina salvini Martens? Bluff.

Pseudosubulina mitescens Martens. Bluff.

Leptinaria elisae (Tristram). Bluff.

Caecilioides consobrina veracruzensis (C. & F.). River drift.

Gastrocopta pentodon (Say). River drift.

Gastrocopta pellucida (Pfr.). A variety with thickened lip. River drift.

Adelopoma stolli (Martens). One specimen in river drift.

Carychium mexicanum costaricanum Martens. River drift.

Aperostoma dysoni (Pfr.). In cacao grove.

Aperostoma n. sp. On the bluff.

Amphicyclotus boucardi (Pfr.).

Helicina amoena Pfr. Cacao grove.

Helicina coccinostoma Morelet, variety *anozona* Martens. Bluff.

Helicina tenuis Pfr., var. *lindeni* (Pfr.), Bluff.

Helicina fragilis Morelet. Bluff.

Schasicheila hinkleyi Pilsbry. Bluff.

Schasicheila walkeri Hinkley. Bluff.

Eutrochatella nicrodina (Morelet) var. *chryseis* (Tristram). Bluff and drift.

Tomocylus simulacrum (Morelet). Bones scattered in recesses of rocks on the side of the mountain below the bluff.

Chondropoma rubicundum (Morelet). Bluff.

Lucidella lirata (Pfr.). Bluff and river drift.

At the places where the writer has collected different forms of slugs were often noticed. Quite a number were put in alcohol, but only two or three forms of *Vaginulus* came through in good condition.

Descriptions of new species and subspecies.

STROBILOPS STREBELI GUATEMALENSIS, n. subsp.

Shell depressed, light brown, with fine costae which extend over the base and into the small umbilicus; on the base the costae are smaller and crossed by longitudinal microscopical striae. Suture well marked, the first one and half whorls are

smooth. Aperture ovate, wide above, narrow below, peristome reflected and chocolate-colored. Height of shell $1\frac{1}{2}$, width $4\frac{1}{3}$ mm.

"This new subspecies differs from the East Mexico *S. strebeli* (Pfr.) by having the periphery more angular; the parietal lamella is more enlarged and prominent at the end, and it has $4\frac{3}{4}$ whorls, *S. strebeli* having a little over 5. *S. salvini* (Tristram) is a higher shell with wider umbilicus."

Found in beach drift of Lake Izabal near Jocolo.

Types in the Academy coll. and in the writer's coll.

Schasicheila walkeri n. sp.

Shell globose conic, thin, imperforate, umbilical region depressed; varies from brownish-yellow to a horn color, under the light brown cuticle. Whorls four, convex, crossed by fine irregular lines of growth and revolving microscopical striae which begin on the otherwise smooth nucleus. The costae and striae are visible under a glass on removal of the cuticle. Aperture subcircular, obtusely angular above with a slight, wide sinus at the base; a callus extends from the columella across the parietal wall to a slight notch at the suture. Operculum missing.

Shell measures: height 6, width 6.5 mm. Aperture, length 4, width 2.5 mm.

Found at a bluff on the mountain north of Chamá, Alta Verapaz, Guatemala.

Named in honor of Dr. Bryant Walker, who is doing good work for the advancement of malacology. Type in collection of the Academy of Natural Science, cotypes in coll. B. Walker and the writer.

Ampullaria lattrei chamana n. subsp.

A small, rather solid, short-spired race, with many bands of ecru-olive on a ground of deep colonial buff. The interior chocolate with some light bands above, lip with a broad chamois or pale yellow border without bands.

The aperture is narrower than in *A. lemniscata* Crosse & Fischer, which appears to be nearly related. The surface is not

irregularly pitted as in *A. lattrei*, and the microscopic spiral striæ are more plainly defined.

The embryonic whorls are dark-colored, almost black.

Height 42, breadth 40; aperture, length 33, width 18 mm.

Height 40, breadth 37.5; aperture, length 32, width 20 mm.

Specimens of exactly this form were collected about twenty years ago at "Rio Negro, Chama," by S. L. Schumo, a member of the Philadelphia Academy of Natural Sciences.

Four specimens were brought to the writer by an Indian; one (figured) is in the Academy coll., one in coll. of Mr. Bryant Walker, one in the Museum of the Illinois University, and the writer has the other.

PACHYCHEILUS POTTSIANUS n. sp.

Shell pyramidal, solid, smooth, of a dingy olive color; whorls eight, hardly convex, a light shade below the suture, the last slightly and broadly depressed on the upper part, in front of the aperture the periphery is obtusely angular, the angle diminishes with the growth of the whorl until the last of the body whorl is broadly rounded. Suture shallow, distinct. Aperture ovate, angular above, circular below, chocolate-colored within, parietal callus well defined and much thickened above, labium slightly thickened. Operculum ovate, nucleus depressed. When the mollusk is in its natural position the shell as viewed from above has the appearance of the penult whorl being humped and the under side of the shell is nearly always eroded as if it had been worn away in moving about. Four specimens measure:

Length 44, width 17. Aperture, length 14, width 8 mm.
Length 41, width 17. Aperture, length 14, width 8 mm.
Length 40, width 16. Aperture, length 15, width 7½ mm.
Length 42, width 17. Aperture, length 14, width 8½ mm.

This species was taken from two rills on hillsides, in dense woods. Often there was only enough moisture to keep the shells damp, or they were under fallen leaves; with them where there was a half inch or more of water were *P. pyramidalis*, from which they differ in being smaller and without any sculpturing. They are wider than *P. indiorum* of the same length, and have

not the color markings of that species. They differ from *P. corvinus* by a more solid texture and a smaller and different shaped aperture.

ANSON A. HINKLEY.

BY BRYANT WALKER.

Mr. A. A. Hinkley was born at Farmersville, Indiana, November 26, 1857, and died in Du Bois, Illinois, July 23, 1920. Living for a time at Rockford, Ill., he moved to Du Bois in 1881. The accompanying portrait though executed in earlier years is still an excellent likeness.

Mr. Hinkley was an enthusiastic, energetic, enterprising and most successful collector. I do not know when he first became interested in conchology. His first note on the subject appeared in "The Conchologists' Exchange," the predecessor of the NAUTILUS in 1887. My own correspondence with him began in 1893. He had then already began to specialize on the *Pleuroceridæ*, which continued to be his favorite study all of his life. Prior to that time he had taken two trips to Tennessee and had participated in the results of R. E. Call's expeditions to Alabama and Georgia. In 1894 and again in 1897 he collected in Tennessee and Alabama. He was also one of the contributors of "the sinews of war" to the remarkably successful work of B. H. Wright in developing the Unione fauna of the southern states in the decade prior to 1900.

In 1903 he began the series of collecting trips which have given him a permanent place in the history of American Conchology. In the winter of that year he explored the Coosa and Black Warrior rivers in Alabama. Two remarkable new genera, *Amphigyra* Pils. and *Neoplanorbis* Pils., and many new species of *Somatogyrus*, *Ancylus* and *Quadrula* were discovered. Mr. Hinkley was the first to develop the minute species of Alabama, which had been almost entirely overlooked by the early collectors in that State, whose attention had been wholly absorbed with the wonderful fauna of *Unionidæ* and *Pleuroceridæ* in that region.

A second trip in the winter of 1904 through Mississippi and to the Mussel Shoals of the Tennessee River resulted in the discovery of several additional species of *Somatogyrus;* the first living specimens of *Pyrgulopsis mississippiensis* C. and P. and a fine species of *Campeloma* that subsequently served to differentiate the *C. coarctata* of Binney from the original *coarctata* of Lea and establish the validity of *C. lewisi* Walker, which was typically based upon specimens collected by him in the Vallabusha River, Miss.

In the winter of 1906–7 he made his first expedition to Mexico and in 1908 a second trip. His collections on these journeys developed the remarkable Melanian and Unione fauna of the Panuco River system. Two new genera, *Pterides* Pils., *Lithasiopsis* Pils., a new subgenus *Emmericiella* Pils., and a great number of new species of both land and fresh-water shells were added to the Mexican fauna.

In 1912 he made his first expedition to Guatemala, a second trip in 1913 and a third in 1917. These resulted in large series of many of the rarer species of that region and the addition of many new species of both land and fresh-water forms to science. The material brought back by him from his last trip has not yet been completely worked up and it is probable that the number of new species will be largely increased when that work is completed.

The sickness and death of Mr. Hinkley's wife in 1915 and his own subsequent ill health kept him at home in that year and also in 1916 and 1918.

In the early part of January, 1919, he joined Messrs. Ferriss and Camp in a long trip "along the Mexican border" which continued until May and has been written up by Ferriss in the NAUTILUS (XXXIII, p. 37). On this expedition he paid special attention to the collection of the minute and fluviatile species. Only a very few of the many new species collected on this trip have, as yet, been published.

In the early summer of that year he made a short trip through western Tennessee and Kentucky and planned a thorough exploration of the Duck River, but unfortunately the project was cut short.

The net result of these many years of field work, if my count is correct, has added four new genera, one new sub-genus and one hundred and thirteen new species to the American fauna, a record that will perpetuate his memory for all time to come.

Mr. Hinkley was not a voluminous writer, preferring to leave to others the description of his material, but was an occasional contributor to the NAUTILUS from 1887 to 1920. His last note appeared in January, 1920, and an article on his third trip to Guatemala is published in this number.

Fifteen species have been named after him, viz.:

Holospira hinkleyi Pils.
Cœlocentrum hinkleyi Pils.
Salasiella hinkleyi Pils.
Averellia hinkleyi Pils.
Lithasiopsis hinkleyi Pils.
Somatogyrus hinkleyi Walk.
Lymnaea hinkleyi Baker.
Ancylus hinkleyi Walk.
Gundlachia hinkleyi Walk.
Amnicola hinkleyi Walk.
Schasicheila hinkleyi Pils.
Pomatiopsis hinkleyi Pils.
Pisidium hinkleyi Sterki.
Sonorella hinkleyi P. and F.
Unio hinkleyi B. H. Wr.

TURRITIDAE VS. TURRIDAE.

BY S. STILLMAN BERRY.

By way of completing my own argument, I desire merely a word in reply to the points brought up by Mr. Dall in the last NAUTILUS. I hope he will forgive me for failing to perceive that his statements are in any way relevant to the real point at issue. This is solely and wholly the application of Article 4 of the International Code of Zoological Nomenclature. As I see it, and now on Dr. Dall's own showing in his final paragraph, *Turritidae* as a family name based on *Turris* is in flat violation of this Article, let alone all admitted principles of Latin orthography. Were the generic name actually spelled *Turritus*, the situation would of course be different, and it is merely this that Professor Foster was attempting to indicate; but such a circumlocution is in no way necessary.

It is a novel principle that a purely derivative name, such as

that of a family, must stand according to its first spelling, however erroneous. Should it ever come into general favor it would lead to some strange results.

The International Code alone must write the "finis" to a discussion of this sort.

ON THE OCCURRENCE OF PYRAMIDULA RUPESTRIS IN MAINE.

BY EDWARD S. MORSE.

Forty years ago while collecting land shells alongside the road in Riley, Maine, 17 miles north of Bethel, I found two specimens of a small Helix, which at the time I mistook for a variety of *Planogyra astericus*, being devoid of the elevated rings following the lines of growth; it was apparently the same size, form and color of *P. astericus*. Instead of being found in an alder swamp in wet ground, a common habitat of *P. astericus*, it was found in a hard-wood growth on the side of a hill associated with *S. labyrinthica*, *S. arborea*, *S. exigua* and other common species. Under the microscope I found the proportions of the shell different, as the accompanying drawings will show. Fig. 1 is the new form; fig. 2 is *P. astericus* drawn on the same scale. Realizing that the shell was new to this country, if not a new species, and not deeming it prudent to describe a new species from two specimens,

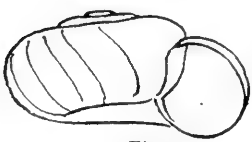


Fig. 1

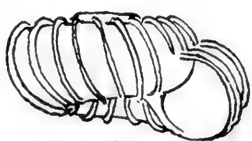


Fig. 2

Fig. 3

I visited the region again in 1891 in company with Major John M. Gould, who was with me the first time. We searched the woods in vain for a specimen of the shell. In August of this year Major Gould again visited the place but could not find the shell. A recent study of European species leads me to regard this *nova* as the old *Helix rupestris* of Draparnaud,

now *Pyramidula.* In Taylor's superb monograph of the land and fresh-water shells of the British Isles the author says of *P. rupestris:* "This species displays a great difference in form, ranging from an almost planorbular spire to a greatly elevated form with almost dislocated whorls, which has its metropolis in the isles of the Aegean Sea." Mr. Taylor figures a depressed form as var. *umbilicata* and says this form is more prevalent in the north of Europe. The spire becomes more elevated as the southern range increases. Fig. 3 represents a specimen of *Pyramidula rupestris* from England. While showing slight differences, the Maine specimens must be regarded the same. If it turns out to be an established variety I would like to dedicate it to Mr. Olaf O. Nylander, who has done such excellent work in studying and collecting the land and fresh-water shells of northern Maine. It will thus stand *Pyramidula rupestris* var. *nylanderi.*

NOTES ON MARINE MOLLUSCA ABOUT NEW YORK CITY.

BY ARTHUR JACOT.

Due to the unusually severe storms of the past winter the beaches about New York City were of special interest to the conchologist. On the one hand, bungalos, hotels, etc., were swept into the ocean bodily, while on the other, great quantities of shells were strewn along the shores.

At Rockaway Beach from the hospital (beyond the Park) to Edgmeer, a distance of four miles, there was an almost continuous rift of "skimmers" (*Spisula solidissima*) along the extreme high-tide line, which averaged two feet deep by ten feet wide. At some places these clams were piled up three to four feet deep, at other places they formed a double rift, while at still others (besides the rift at highest tide line) they were strewn as a thick carpet over that part of the beach laid bare at low tide. Counting 50 individuals per square foot, we estimated there were at least 5,000,000 per linear mile. It will be interesting to notice the abundance of this

species along this strip of beach after next winter's storms. It seems as though a large colony has been whipped out for a distance of several miles. At Long Beach (the next beach eastward) there were a dozen or two *S. solidissima* per linear rod.

We tramped over the top of this gigantic funeral pile for a distance of half a mile, starting near the hospital. As a result we picked up 16 specimens of *Pecten magellanicus* (with the animal) besides a few odd valves. Beyond the half mile the species was not found. The most astonishing find of the day, however, was a large specimen of *Buccinum undatum* fairly well covered with *Hydractinia echinata* and occupied by a putrid hermit. This species is of accidental occurrence west of the eastern end of the island. It is not an inhabitant of our sandy beaches.

On the channel side of Long Beach where dredges are widening the channel and building up land we found some hundred-odd specimens of *Ensis directus* freshly cast up. The largest had a width of $1\,^5/_{16}$ inches and a length of over 7 inches. A very few were found which were perfectly straight-looking from the outside like a true *Solen,* but when they were cleaned out and the hinge examined they were found to be *Ensis.* As I have never found the slightest indication of a Solen in this vicinity, nor as I do not know of a single authentic record of one for our coast, I am forced to the conclusion that the lots in the American Museum collection (as well as those in other museums) labeled New York and forming parts of the collections of shell fanciers have (as is the case with many other species) the wrong locality attached to them through carelessness or ignorance. This error seems to have been a common one for this species and it is time it be definitely rectified. This mistake of locality in collections of collectors of shells as a hobby (as the Jay, Haines, Newcomb, etc., collections) is common, so that their collections should not be considered for distributional records of species.

ANIMAL LIFE IN LOESS DEPOSITS NEAR ALTON, ILLINOIS, WITH DESCRIPTIONS OF TWO NEW VARIETIES OF LAND SHELLS FROM THE SAME DEPOSITS.*

BY FRANK COLLINS BAKER.

Many years ago Worthen (Geol. Ill., Vol. I, p. 315, 1866) reported the remains of a mastodon from near the City of Alton, from a deposit near the bottom of the loess, about thirty feet beneath the surface, where it was separated from the limestone by two to three feet of local drift. It was also stated by Worthen that the loess above the drift contained land and fresh-water shells. The only other reference to this deposit or its animal life, as far as known to the writer, is by Wm. McAdams (Proc. A. A. A. S., Vol. XXXII, p. 268, 1883). Recently Dr. M. M. Leighton, of the Department of Geology, University of Illinois, and also connected with the State Geological Survey, visited Alton and vicinity, and made a careful study of the Quaternary deposits, to determine the stratographic horizon of the concretions with which the mammalian remains are associated. During his study of the loess deposits he collected from them at different specified levels the remains of molluscan life, and has given me the following statement concerning the character and age of these deposits.

"The bluffs just northwest of Alton have a height of from 125 to 175 feet above the Mississippi River. Several quarries are located along the bluffs, which offer fine sections of the Mississippian limestone, some 50 to 100 feet thick, overlain by thin drift and thick loess deposits.

"The loess is separable into two deposits, a lower pink loess and an upper buff loess. The pink loess lies unconformably on the glacial till below, the till showing strong evidence of a long interval of weathering before the deposition of the pink loess. The till may well be as old as the Kansan, in which case the pink loess is probably Sangamon; if the till is Illinoian the pink loess cannot be older than late Sangamon, and may be

* Contribution from the Museum of Natural History, University of Illinois, No. 14.

Iowan or early Peorian. Although the pink color of the loess is believed to be largely original, there is some evidence suggesting that the pink loess was weathered somewhat before the deposition of the overlying buff loess. The interval of weathering, however, was doubtless brief. The buff loess is leached and oxidized at the top similar to the early Peorian loess (formerly called Iowan), and this strengthens the view that the pink loess is Sangamon. The mammalin remains at the top of the till and the base of the pink loess seem most likely to be early Sangamon. The calcareous concretions with which they are associated are secondary and, hence, later."

The mollusks collected embrace thirteen species of land shells, including two that appear to be undescribed. No lacustrine or fluviatile species were obtained (as would be expected), these mollusks being very rare or absent in true loess formations. Worthen's statement of the presence of fresh-water shells may have referred to the genus *Succinea*, some species of which occur in the vicinity of water bodies, though the loess *Succinea* are of the upland species and not the lowland species that are abundant near water (*Succinea retusa*, for example). The species of land shells in the deposit are the same, for the most part, as those found in typical loess deposits in Iowa and adjacent states. Except where mentioned the species are normal in form.

The division of the loess into two bodies, differing in color and probably attesting different periods of deposition, indicates that the deposition of the loess has been periodic rather than continuous. This is in line with the findings of Dr. Wm. C. Alden and Dr. Leighton in regard to the loess associated with the Iowan drift sheet in Iowa.† The cause of these epochs of loess deposition with breaks between is still a matter of conjecture. It is the writer's opinion that it might represent the presence of the Iowan ice to the north of the region.

Dr. Leighton reports that shells were more or less common at all levels of the loess. The age of these molluscan remains may be tentatively indicated in the following table. It will be noted

† Alden, Wm. C., and Leighton, M. M. The Iowan Drift, Iowa Geological Survey, Vol. XXVI, pp. 49 to 212, 1917.

that the pink loess, believed to be of Sangamon age, is the richest in number of syecies, and that the characteristic post-Iowan (*Peorian*) fossil, *Pyramidula shimekii* occurs only in the buff loess. Whether this distribution is to be considered as applying to the whole body of the loesses of this area, or is simply the result of local collecting, cannot be known until more extensive collections are made. The collections made by Dr. Leighton are from several localities in both Madison and St. Clair counties and also from different levels in the deposits, and these are believed to represent fairly well the general distribution of the loess faunas of this region. It is probable that a larger number of the minute species could be found as a result of prolonged search carried on especially for them. The material has been placed in the University of Illinois Museum through the courtesy of the Illinois Geological Survey. They are numbered P 738 to P 764 of the collection of Palaeontology.

TABLE OF DISTRIBUTION OF LIFE IN LOESSES NEAR ALTON.

Concretionary horizon.	*Polygyra profunda pleistocenica.*
(Above underlying till, believed to be Kansan.)	*Castoroides ohioensis* (incisor tooth).
	Mammut americanum (Kerr). (Reported by Worthen.)
Yarmouth interval.	
Pink loess believed to be of Sangamon age.	*Polygyra profunda pleistocenica.*
	Polygyra multilineata altonensis.
	Polygyra hirsuta.
	Polygyra appressa.
	Pyramidula alternata.
	Helicodiscus paralellus.
	Gastrocopta armifera.
	Zonitoides arborea.
Upper part of loess.	*Circinaria concava.*
	Succinea ovalis.
	Helicina occulta.
Buff loess.	
Early Peorian interval.	*Pyramidula shimekii.*
	Succinea ovalis.

The localities at which shells were obtained, together with the species found at each, are listed below.

From the concretionary horizon at the base of the pink loess and at the top of the underlying till; plant number 2 of the Mississippi Lime and Materials Co., Alton, Madison Co.

Polygyra profunda pleistocenica Baker.

Castoroides ohioensis Foster. Given to Dr. Leighton and said to have come from this horizon. Only a single incisor tooth (the left) was collected.

The *Polygyra* was apparently very abundant at this horizon, seven pieces of concretions containing ten specimens of shells. The concretions are of lime which is very hard. Some of the shells are internal casts.

From the lower ten feet of the pink loess, plant No. 2 Mississippi Lime and Materials Co., Alton. Many fragments of shells occurred, indicating an abundance of the different species at one time.

Polygyra profunda pleistocenica Baker. A few specimens.
Polygyra multilineata altonensis Baker. A few specimens.
Polygyra hirsuta (Say). Rare.
Gastrocopta armifera (Say). One specimen.

From the upper part of the pink loess, plant No. 2 Mississippi Lime and Materials Co., Alton.

Polygyra profunda pleistocenica Baker. A few specimens.
Pyramidula alternata (Say). A few specimens.
Circinaria concava (Say). One specimen.
Succinea ovalis (Say). Several specimens.
Helicina occulta Say. One specimen.

From cliff of loess near corner Market and East 6th Street, Alton. From pink loess.

Polygyra profunda pleistocenica Baker. Common.
Polygyra multilineata altonensis Baker. One specimen.
Polygyra appressa (Say). Common.
Polygyra hirsuta (Say). Rare.
Pyramidula alternata (Say). Not common.
Helicodiscus paralellus (Say). One specimen.
Circinaria concava (Say). One specimen.

From pink loess at Edgemont, St. Clair Co., north side of interurban railway.

Polygyra profunda pleistocenica Baker. Rare.

Zonitoides arborea (Say). One specimen.

From lower part of buff loess at Edgemont, St. Clair Co., north side interurban railway.

Pyramidula shimekii (Pilsbry). A few very large specimens, one individual measuring 7.10 mm. in greatest diameter.

Succinea ovalis Say. The Succineas are apparently this species, although they exhibit some variation, especially in the height of the spire. They are not *grosvenorii*, which occurs in the loess deposits of Iowa.

Description of New Varieties.

Polygyra multilineata altonensis n. var.

Shell differing from typical *multilineata* in being larger, the whorls more gibbous, the spire more depressed, and the sutures between the later whorls more deeply impressed; the last whorl begins to rapidly descend on the previous whorl until the upper part of the outer lip rests against the periphery, instead of above this point, as in *multilineata;* the deflection of the upper part of the whorl toward the aperture is also more abrupt, and forms a distinct shoulder at this point; the reflected lip is much heavier as is also the umbilical callus; the spiral color bands and lines are apparently much less numerous than in typical *multilineata.*

Greatest diameter, 32; height, 19.5; aperture height, 14; breadth, 14 mm. Holotype. U. I. No. P. 740 A.

Greatest diameter, 28; height, 15.5; aperture height, 11; breadth, 12 mm. Paratype. U. I. No. P. 740 B.

Horizon: Lower ten feet of pink loess, plant No. 2 Mississippi Lime and Materials Co., Alton, Madison Co., Illinois.

This form of *multilineata* is so uniformly different from the usual form and size of this species that it seems to require a special designation. It probably occurs in other loess deposits. The greater size and gibbous-shaped whorls are sufficiently characteristic to cause its immediate recognition. This variety is apparently not common in these loess deposits, only four

specimens being obtained by Dr. Leighton. The type material is from the lower part of the pink loess. The variety does not occur (apparently) in the higher or later loess deposits of this region.

Polygyra profunda pleistocenica n. var.

Shell uniformly smaller than typical *profunda*, more solid, with slightly higher spire and proportionally smaller aperture and umbilicus; the color bands are developed in but two specimens of the 19 specimens examined, the majority of the individuals being unicolored.

Greatest diameter, 22; height, 14.7 mm. Holotype. U. I. No. P. 751 A.

Greatest diameter, 24; height, 14 mm. Paratype. U. I. No. P. 751 B.

Greatest diameter, 26; height, 14.7 mm. Paratype. U. I. No. P. 751 C.

This race or variety of *profunda* is the most common land shell in the loess of the vicinity of Alton. The characteristics noted above will easily distinguish it from typical *profunda*. This variety recalls *Polygyra profunda strontiana* Clapp (Ann. Carnegie Mus. X, p. 537, pl. xxxii, figs. 13–15, 1916), the sizes being about the same in the two forms. In *strontiana*, however, the spire is higher and the shell of different shape. *Pleistocenica* is not common in the lower deposits of the loess near Alton nor in the higher deposits. It reaches its greatest development near the middle of the pink loess, from which the greater number of specimens came.

From pink loess on cliff of loess, corner Market and East 6th Street, Alton, Madison Co., Illinois.

NOTE ON A PREOCCUPIED GENERIC NAME IN CEPHALOPODS.

BY S. STILLMAN BERRY, REDLANDS, CALIFORNIA.

In 1913 (Zool. Anz., Bd. 42, p. 590) I proposed the name *Acroteuthis* as that of a genus of cephalopods having the *Sepia media* Linnæus 1767 as type, the said genus being

practically equivalent to the old *Teuthis* Schneider 1784, *not* of Linnæus 1766, which is a genus of fishes.

It has recently been called to my attention that *Acroteuthis* in this sense is itself invalid by reason of the existence of a prior usage of the same name in connection with a fossil genus of the same group of mollusks, a fact which had escaped my notice because of an almost complete lack from my library of the literature of cephalopod paleontology.

To remedy this unfortunate situation, I would suggest that the name *Acruroteuthis* be adopted as a substitute for *Acroteuthis* Berry 1913.

NOTES ON A SMALL COLLECTION OF SHELLS FROM ALASKA.*

BY FRANK C. BAKER.

A small collection of Alaska mollusks has recently been given to the Museum of Natural History which is of considerable interest. It was collected by Dr. Henry B. Ward, head of the Department of Zoology, University of Illinois, while engaged in survey work for the United States Bureau of Fisheries. The shells were collected incidentally during the months of July and August. The two bodies of water from which the material was collected are in the Copper River drainage and their location is thus described by Dr. Ward:

"The two lakes referred to as the locations from which the mollusks came are both in the drainage of the Copper River. Long Lake lies just off the Chitina River, which is the main tributary of the Copper River. The lake is right alongside the Copper River and the Northwestern Railway track, and is something like 150 miles from Cordova.

"Saint Anne Lake empties into Lake Klutina, which in turn empties through the Klutina River into the Copper River. This is on the west side of the drainage basin, about 250 miles from the Long Lake locality."

* Contribution from the Museum of Natural History, University of Illinois, No. 12.

Outlet of Long Lake.

Galba randolphi (Baker). Half-grown and typical.

Galba vahlii ("Beck" Möller).

Planorbis similaris Baker.

Two young individuals (three whorls) of a small Planorbis are indistinguishable from specimens of *similaris* of the same size from Colorado. They are not like *parvus* from near Philadelphia, having a less number of whorls in specimens of the same size, and the base lacks the reamed-out appearance so characteristic of typical *parvus.* The two localities are widely separated although the ecological and general climatic conditions are the same, the Colorado specimens occurring in a lake at an altitude of 8575 feet (see Bull. Amer. Mus. Nat. Hist., Vol. XLI, p. 532, 1919). This small Planorbis will doubtless be found in many places between these extreme localities, when it is discriminated from *parvus.*

Pisidium species.

Sterki says of this Pisidium, of which only four specimens were collected, "unknown to me; probably immature."

Saint Anne Lake.

Galba randolphi (Baker). Half-grown specimens.

Galba vahlii ("Beck" Möller).

The lymnaeids referred to *vahlii* were at first thought to be referable to *palustris.* The generally thinner, almost paper-like shell and the wide columella callus without well-marked plait seem to place them rather under *vahlii.* The spire in nearly all of the specimens is very long and the whorls are inclined to be flat-sided, differing in this respect from typical *vahlii.* This species, like the protean *palustris,* of which it is a near relative, probably exhibits a wide range of variation.

Valvata lewisii helicoidea Dall.

A single specimen of Dall's variety of *Valvata lewisii* occurred with the material from Saint Anne Lake. It corresponds in every way with the original description and figures (Alaska Mollusks, p. 123, pl. ii, figs. 1, 2) but is smaller than the specimen figured by Dall. The measurements of the Saint Anne Lake specimen are: height 2.2; greatest diameter 4 mm. The

variety has also been seen from Lake Winnipeg, Manitoba, collected by Professor C. H. O'Donoghue, of the University of Manitoba. It will probably be found to be widely distributed in Canada and Alaska.

Sphaerium tenue Prime.

Pisidium idahoense Roper.

A single specimen each of these two Sphaeriidae was contained in the Saint Anne Lake material. These specimens are typical.

I am indebted to Dr. V. Sterki for the determination of the Sphaeriidae from this locality as well as from the outlet of Long Lake.

NOTES.

NOTES ON CERTAIN BRACHIOPOD GENERA. — A recently published and valuable paper on the recent species of Brachiopoda in the National Museum (Dall, W. H., Proc. U. S. Nat. Mus., Vol. 57, pp. 261-377, 1920) places before students of the Brachiopoda a carefully prepared catalogue of the species contained in the National Museum collection and also brings together from many scattered sources valuable data on geographic and bathymetric range and bottom temperature. The author has also cleared the field of a number of mooted questions in synonymy and it is to be regretted that the paper is not accompanied with illustrations of the new species named. For the *Terebratula grayi* Davidson 1852, Dr. Dall proposes the subgeneric term *Pereudesia,* which fact is unfortunate, since J. W. Jackson (Geol. Mag., Decade 6, Vol. 3, pp. 21-22, 1916) used the term *Thomsonia* in a full generic sense for the peculiar type of structure that obtains in *Terebratula grayi* and *Terebratula grayi transversa,* and at a later date (Geol. Mag., Decade 6, Vol. 5, pp. 479-480, 1918), finding the term *Thomsonia* preoccupied, he alters to *Coptothyris,* which name will of necessity hold preference over Dr. Dall's *Pereudesia.*—DARLING K. GREGER.

Brasilica Clark 1913. This generic term was erected by Dr. John M. Clarke (Monog. do Serv. Geol. e Mineral. do Brazil, Vol. 1, pp. 214-216, 1913) with the *Centronella? margarida* Derby as the genotype. The use of the term *Brasilica* is not applicative, in view of the fact that it was employed by S. S. Buckman in 1898 for a genus of *Ammonites,* with the Jurassic species *A. bradfordensis* as the genotype. The generic term *Chapadella* is here proposed for the type of loop structure exemplified in *Centronella? margarida* Derby, the genotype. Chapada is a small village in Matto Grosso, Brazil, near which place H. H. Smith collected the material originally used by Dr. Derby in his paper published in the Revista do Museu. Rio de Janeiro, 1896.—Darling K. Greger.

Zonitoides nummus in Indiana.—In looking over a lot of shells collected on Feb. 28, 1904, by the late A. C. Billups from Great Miami River drift, Lawrenceburg, Ind., I found specimens which I take to be *Zonitoides nummus* Van., so am sending some. This is far out of the recorded range of this species so far as I know. The balance of the shells are what one would expect from that region. A good many of the *Z. minusculus* have the thickening of the lip, or rather back of the lip, "bourrelet" I believe the French call it. This is not a mark of maturity, as many of the half-grown shells have it. —Geo. H. Clapp.

PUBLICATIONS RECEIVED.

Journal de Conchyliologie, 1920, Vol. 66, No. 4. Révision des Cypricardiacea et des Isocardiacea Vivants du Muséum D'Histoire naturelle de Paris. Par Edouard Lamy. Pp. 259-307. A very exhaustive treatise on this group of bivalves.

Proceedings of the Malacological Society of London, Vol. 14, Pl. 1, Apr. 1920. A new subspecies of *Papuina tayloriana* from Dampier Island, by Hugh C. Fulton, p. 2. *P. tayloriana dampierensis.*

Molluscan Notes IV, by Hugh C. Fulton, p. 3. *Ennea pallaryi* Preston = *E. vriesiana* Ancy; *Xestina grunulosa* Mölldff. = *H. danae* Pfr.; *Goniostomus subhybridus* Da Costa = *Bulimulus (Drymæus) pulcherrimus* H. Adams; *Pseudachatina daillyana* Pilsbry = *P. perelongata* Rolle; *Neptunea antiqua japonica* Dautz. & Fisch. = *Chrysodomus intersculptus* Sowb.

Additions to the List of Recent Middlesex Mollusca. By J. E. Cooper, p. 5.

The Affinities of Pyramidula, Patulastra, Acanthinula and Vallonia. By Hugh Watson, pp. 6-30, pls. 1 and 2.

On *Mitra montereyi*, a new Californian species. By S. Stillman Berry, pp. 31-33.

On Six Variations of *Clausilia bidentata* and *Ena obscura*, with a locality. By A. E. Boycott, pp. 34-42.

On *Mitra montereyi*, a new Californian species. By S. Stillman Berry, pp. 31-31.

On the Size Variation of *Clausilia bidentata* and *Ena obscura*, with a locality. By A. E. Boycott, pp. 34-42.

Contributions to the History of the Cerionidæ. By C. J. Maynard (Pts. 1-5, App. to Vol. 10, Records of Walks and Talks with Nature).

On Certain Fossil Shells in the Boulder Clay of Boston Basin. By Edward S. Morse (Amer. Jour. Sci., 1920, Vol. 49, pp. 157-165). A very interesting paper. The author believes that the thick fragments found in the various deposits represent the southern *Venus campechiensis* and not *V. mercenaria*.

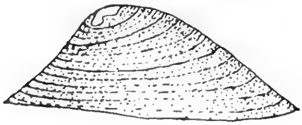
A Classification of the American Operculated Land Mollusks of the Family Annulariidæ. By John B. Henderson and Paul Bartsch (Proc. U. S. Nat. Mus., 1920, Vol. 58, pp. 49-82). In this paper American "Cyclostomidæ" are separated from the Old World groups and placed in the family Annulariidæ, the principal character used in separating them being the radula.

ANNOTATED LIST OF THE RECENT BRACHIOPODA IN THE COLLECTION OF THE UNITED STATES NATIONAL MUSEUM, WITH DESCRIPTIONS OF THIRTY-THREE NEW FORMS. By William H. Dall (Proc. U. S. Nat. Mus., 1920, Vol. 57, pp. 261-377). The collection of recent Brachiopods in the National Museum is unusually strong, containing 181 different forms, represented by over 6,000 specimens, including many original types.

ON THE ANATOMY OF PALUDESTRINA JENKINSI. By C. G. Robson (Ann. Mag. N. H., 9 ser., V, May, 1920). This species has long been of interest on account of its rapid spread through the waterways of England, Wales and Ireland, and recently from the discovery that it is apparently parthenogenetic. It has a large crystalline style. There is a well-developed pedal gland as in *Valvata*. In the ovary were seen oöcytes but no spermatozoa. There is also an organ corresponding to the spermatheca. The capacious brood-pouch is excavated in the pallial integument of the right side, and capable of holding over 40 young. The writer has already suggested that *P. jenkinsi* is a *Potamopyrgus;* it should be compared with some of the tropical species, none of which have been dissected.—H. A. P.

THE RADULA OF THE MITRIDÆ. By Rev. A. H. Cooke (Proc. Zool. Soc. London, 1919 [1920], pp. 405-422, 18 figs. in text). A valuable contribution to our knowledge of the radula of this family. The work is based largely on the collection of the late Prof. H. M. Gwatkin.

COSTA RICAN LAND AND FRESHWATER SHELLS. By H. A. Pilsbry (Proc. Acad. Nat. Sci., 1920, pp. 2-10, 6 figs. in text). The paper is based on a collection made by Dr. P. P. Calvert and Mrs. Calvert in 1909 and 1910. Five new species are described.—C. W. J.



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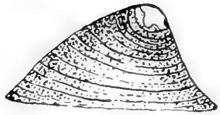

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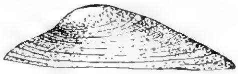

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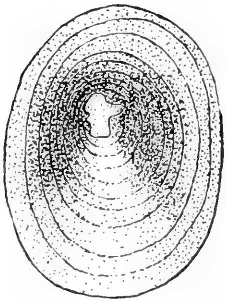

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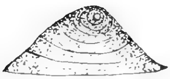

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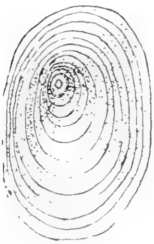

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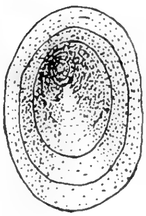

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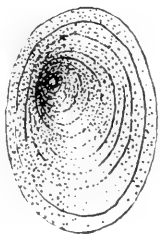

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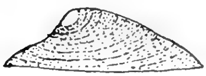

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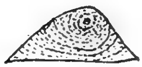


12

WALKER: FERRISSIA OBSCURA ETC.

THE NAUTILUS.

Vol. XXXIV JANUARY, 1921. No. 3

ANCYLUS OBSCURUS HALDEMAN AND SPECIES REFERRED TO IT.

BY BRYANT WALKER.

(Continued.)

Through the courtesy of M. Menard of the Museum of Geneva, Switzerland, I have received photographs and other valuable data in regard to the types of the unfigured West-Indian species of *Ancylus* described by Bourguignat and have consequently been enabled to differentiate the following species with more certainty that I otherwise should have been.

IV.

Ferrissia jamaicensis n. sp. Pl. III, figs. 1–3.

Shell depressed, oval, slightly wider at the anterior end; lateral margins equally curved; anterior slope nearly straight, being very slightly convex towards the apex; posterior slope concave; the left lateral slope a little convex; the right lateral slope concave; apex obtuse, excentric, turned toward the right side, obscurely radiately striate, situated about halfway between the median line and the right margin and at about two-fifths of the length from the posterior end; lines of growth fine, but distinct and regular, with traces of subobsolete wrinkles on the anterior slope; light horn color.

Length (type) 5.25: width 3.5, alt. 1.5 mm.

Length (paratype, Adams' Coll.) 5.1; width 3.25, alt. 1.3 mm.

Type locality Jamaica. Also Kingston, Jamaica.

Type No. 34825 Walker Coll. Paratype in Adams' Collection.

There are one nearly mature specimen and three immature ones in the Adams' Collection received from Chitty and labeled "*obscurus?*" from Kingston, Jamaica. My own set of four specimens was received from Sowerby and Fulton as "*obscurus*". As these are apparently fully developed and are quite congruous in character, I have selected one of them as the type. The largest specimen in the Adams Collection is narrower than the type, the apex less eccentric and the posterior slope is longer and nearly straight below the base of the apex. The radial sculpture of the apex is very distinct in this specimen. When additional material can be obtained, it may prove to be, at least, varietally distinct.

After carefully reviewing my material I am now inclined to think that the Guadeloupe specimens considered as conspecific in the first part of this paper (Naut., XXXIII, p. 99), though rather similar, are different. They will be considered elsewhere.

This species is also evidently related to *A. beaui* Bgt. from Guadeloupe, but as compared with the figures of Bourguignat's type, it is somewhat larger, proportionately not so wide, the anterior slope is less convex, the posterior slope longer and it lacks the distinct radial striation on the anterior slope, which, though not mentioned by Bourguignat, shows very distinctly in the photograph of his type.

V.

Ferrissia adamsi n. sp. Pl. III, figs. 7–9.

Shell depressed, oval, very slightly wider anteriorly; lateral margins equally curved; anterior slope nearly straight; posterior slope straight below the base of the apex at which point it is slightly incurved; left lateral slope very slightly convex; right lateral slope a little concave; apex prominent, very obtuse, slightly turned toward the right margin, situated nearly on the median line and about one-third of the length from the posterior end, radiately striate; surface smooth except for the distinct, rather coarse, regular lines of growth; light horn color.

Length 4, width 2.75, alt. 1.25 mm.

Type locality Kingston, Jamaica.

Type No. 50983 Walker Coll. Paratype in the Adams Collection at Amherst College.

I can not approximate this species to any that have been described from the West Indies; several specimens were in the lot received by Adams from Chitty mixed with the preceding species. Compared with that, *adamsi* is smaller, more heavily concentrically striate with growth lines, the apex is much more obtuse, more elevated and scarcely at all eccentric.

VI.

The third form mentioned (l. c. p. 99) as occurring in the Adams' "*obscurus*" from Jamaica consists of a number of small specimens in both lots, which, at first, I thought represented a distinct species, but after carefully reviewing them again I think it probable that they are young shells of the two preceding species; at least, I do not feel like describing them as distinct from the comparatively small series now available.

VII.

Ferrissia blandi n. sp. Pl. III, figs. 10–12.

?Ancylus obscurus Hald., Shuttleworth, Ann. Lyc., N. H. N. Y., VI, 1854, p. 72; Diag. Neuer Moll., No. 6, 1354, p. 99.

Shell small, slightly elevated, broad oval, a little wider anteriorly, both ends broadly rounded; right lateral margin nearly straight; left lateral margin somewhat more curved, especially anteriorly; anterior slope nearly straight; posterior slope short and slightly incurved; right lateral slope slightly concave; left lateral slope a little convex; apex prominent, obtuse, slightly turned toward the right side, situated at the posterior third of the length and to the right of the median line, distinctly radially striate; surface smooth except for the fine, regular lines of growth and traces of irregular rippling on the anterior slope; light horn color.

Length 2.75; width 1.8, alt. .8 mm.

Type locality St. Vincent Island, West Indies.

Type No. 50984 Coll. Walker. Paratypes in the Adams Collection at Amherst College.

The history of these specimens has already been given. This

little species seems to be quite distinct from any of those described from the West Indies. It is quite different in shape and proportions from *A. bermudensis* Van., which is the only one that approximates it in size.

Named after the original collector, the late Thomas Bland.

Explanation of Plate III.

Figs. 1, 3. *Ferrissia obscura* (Hald.). See NAUT., XXXIII, p. 101.

Figs. 4, 6. *Ferrissia jamaicensis* Walker.

Figs. 7, 9. *Ferrissia adamsi* Walker.

Figs. 10–12. *Ferrissia blandi* Walker.

TWO NEW PLIOCENE PECTENS FROM NOME, ALASKA.*

BY WILLIAM H. DALL.

The U. S. Geological Survey has recently received from Otto Halla of Nome, some fossil shells from a subterranean Pliocene beach reached by a shaft at twenty feet below the surface near the Solomon River. Among these specimens were *Astarte carteriana* Dall, a *Venericardia* like *alaskana* Dall, but much larger and heavier; fragments of a *Chrysodomus*, and two magnificent new species of *Pecten*. *Pecten lioicus* Dall, and *P. kindlei* Dall, both markedly peculiar forms of the subgenus *Chlamys*, had already been obtained from these anciently uplifted and now buried beaches, and doubtless when fully explored they will afford many other things of interest. The characteristics of the fauna indicate a warmer sea than at present exists at Nome, and the species as a rule are larger and heavier than their recent or Pleistocene analogues.

PECTEN (PLAGIOCTENIUM) HALLAE n. sp.

Right valve convex, heavy, subcircular, with subequal ears, hinge-line wide and straight, the ears sculptured with rather rude incremental lines; radial sculpture of the valve consisting

* Published by permission of the Director of the U. S. Geological Survey.

of 17 or 18 low, rounded ribs with rather shallow narrower interspaces channeled only near the beak; the minor sculpture, if any existed, has been removed by abrasion but there are faint traces of fine radial striae in the interspaces; the hinge has a very large resiliary pit with a narrow ridge on each side of it; the adductor scar was large and the the margins of the valves was undulated by the external sculpture. Height of right valve, 120; width, 125; length of hinge-line, 70; (semi) diameter, 28 mm. U. S. Nat. Mus. Cat. No. 333042.

A fragment has a width of 147 mm. The nearest relative is perhaps the Pliocene *P. cerrosensis* Gabb, which has twenty-five much stronger ribs with much narrower interspaces, and a less inflated and smaller shell.

PECTEN (PATINOPECTEN) RHYTIDUS n. sp.

Right valve very thick and heavy, little inflated, subcircular, with 13 or 14 narrow ribs, here and there subnodulous or slightly imbricated, with much wider flattish shallow interspaces; the whole surface is finely radiately striated; there is no minor sculpture except the striation; the hinge-line long, straight, the ears subequal with coarse incremental sculpture; resiliary pit deep and wide, with a strong groove on each side; adductor scar large; valve-margins undulated by the external sculpture. Height of shell, 128; width of shell, 130; of hinge-line, 80; (semi) diameter, 12 mm. U. S. Nat. Mus. Cat. No. 333044.

No species of the late Tertiary or Recent fauna resembles this at all closely.

THE TYPE LOCALITIES OF LYMNAEA EMARGINATA SAY AND L. AMPLA MIGHELS.

BY OLOF O. NYLANDER, CARIBOU, ME.

In 1821 Thomas Say described *Lymnæus emarginatus* (Jour. Acad. Nat. Sci., Phila., II, 170) discovered hy Aaron Stone in lakes of Maine. The type is apparently lost and the name of the lakes not given. Walter Wells in his book "The Water-

Power of Maine, Augusta, 1869," states: "The total count of those [lakes] represented upon the maps as connected with our rivers * * * not including the multitude of small ponds * * * is not less than one thousand six hundred and twenty." Of the above lakes 1568 are located within the State. In the "Fourth Annual Report of the State Water Storage Commission," 1913, page 322, the number of lakes and ponds in Maine is given as 2,222.

I have examined many of the Maine lakes, and from Moosehead Lake in the center of the State north to Temiscouata Lake, in Quebec, has been my collecting ground for over 30 years.

I have found specimens of *Lymnæus emarginatus* Say, that seem to compare with Say's description in only one lake; this is located on the east branch of First River between Long Lake and Cross Lake, Aroostook County, in Township XVII, Range 4, about lat. 47° 10′ N., and long. 68° 16′ W. It is called *Mud Lake or Second Lake.* Prof. F. C. Baker has examined in his studies of the "Lymnæidæ of North and Middle America," a large series of specimens from Mud Lake, and his opinion is that we have the true type in this lake. If students of shells will agree with me, let us call this the type locality of Say's *Lymnæus emarginatus.* For a description of this locality see THE NAUTILUS, Vol. XV, page 127.

Prof. Edward L. Morse visited this locality (Mud Lake) in June, 1859, hoping to rediscover *Limnæa ampla* of Mighels, and gave me a full account of his trip at the meeting of the Boston Malacological Club, Feb. 10, 1913. Prof. Morse in going to this lake, followed the account given by Dr. Mighels, and I followed the published accounts given by both Mighels and Morse. The fact is *Lymnæa ampla* Mighels is not found in Mud Lake (or Second Lake).

There is no name on any of the old maps of Mud Lake (or Second Lake). Say's original paper gave the locality: "Inhabits Lakes of Maine," and others say "Lakes in northern Maine (Say)." If northern is correct, Mud Lake is the type locality.

The type specimen of *Lymnæa ampla* was lost in the fire that

destroyed the custom house of Portland, Maine, 1854, together with all of Dr. Mighels' specimens.

In the summer of 1842 Alexander Longfellow, assisting in the Boundary Survey, collected in Second Eagle Lake, North lat. 47°, four specimens of *Lymnæa ampla* together with *Physa ancillaria.* This lake is also located on the east branch of Fish River and is at this time known under the name of Square Lake. The specimens collected by Mr. Longfellow and illustrated and published by Dr. Mighels in Boston Journal Natural History, Vol. 4, page 347, pl. 16, came from Square Lake inlet. The great trouble to all workers in natural history is the many changes in the names of places. This might have been avoided if the map makers had not made it their business to change names on every new edition. Specialists and makers of new species in every new edition of their works are changing the names of the species described, each calling them *Scientifically Correct.* What to-day (1920) is called Fish River lakes was called in 1860 Eagle Lakes; what is now Eagle Lake was called Lake Winthrop in 1860. Square Lake of to-day had the name of Lake Sedgwick in 1860, and was known as Second Eagle Lake in 1842. Cross Lake of to-day bore the name of Lake Preble in 1860, and Long Lake was Cleveland Lake in 1860. The French settlers that live in the vicinity of the Fish River Lakes are still using the old names.

Lymnæa emarginata Say and *L. ampla* Mighels have also undergone several changes during this period of 100 years, as the following list shows:

Lymnæus emarginatus Say, 1821.
Limnea emarginata Haldeman, 1842.
Galba emarginata Baker, 1911.
Limnœa ampla Mighels, 1843.
Radix ampla Morse, 1864.
Lymnæa mighelsi Binney, 1865.
Lymnæa (Radix) mighelsi Dall, 1905.
Limnæa emarginata var. *mighelsi* Nylander, 1901.
Galba emarginata mighelsi Baker, 1911.

What will it be one hundred years from now? I have some

fine specimens from the original localities that I will exchange with museums and collectors for specimens or publications new to my collections.

NOTES ON THE NAIAD FAUNA OF THE UPPER MISSISSIPPI RIVER.*

BY N. M. GRIER.

I. On the Anatomy of *Lampsilis higginsii* Lea.

Ortmann (1) is inclined to suspect that this species is merely a local form of *L. orbiculata* Hildreth, the form of very large rivers with muddy bottom, rather than the northern representative of that species, which some consider to be distinctly southern. Examination of the soft parts of *higginsii*, obtained while in the service of the United States Bureau of Fisheries, convinces me of the conformity of *higginsii* with descriptive material given for the genus *Lampsilis* by Simpson (3), and by Ortmann for *L. orbiculata* (2).

The most important point of resemblance between these two species is the common possession of a mantle flap greatly resembling that in *L. ventricosa*, and which obtains its greatest development in the female. As such a structure in *higginsii* seems to have been overlooked, detailed description of it follows. The papillae on the posterior border of the mantle obtain the greater development, those situated anteriorly being quite stunted when present. At the beginning of the posterior half of the mantle edge, the latter thickens to form a grooved flap which shortly attains a width three times that of the adjacent portions of the mantle edge, but which narrows down above the anal opening to a width equal to that of the anterior edge of the mantle. The greatest thickness is obtained at a

* Published by permission of the United States Commissioner of Fisheries.

1. Ortmann, A. R., "Notes upon the Families and Genera of Najades". Annals of Carnegie Museum, Vol. VIII, 1912, p. 353.

2. *Ibid.*, "Monograph of the Najades of Pennsylvania, Part III". Memoirs Carnegie Museum, Vol. VIII, No. 1, 1919, p. 324.

3. Simpson, C. T., "Descriptive Catalogue of the Naiades". B. Walker, Detroit, pp. 77–78.

point approximately ¾ of the distance along the mantle edge from the anterior end, where the edge is produced into a triangular process, directed somewhat anteriorly, and which is in the line with the anterior edge of the post-adductor muscle. Above, this process is spotted wtth a medium brown color, and its edge is produced into papillae which become finer towards the coarser ones of the branchial and anal regions. Below, the coloration appears confined to a strip widest near the vertex of the process described, and is succeeded posteriorly by the papillae previously mentioned.

WASHINGTON AND JEFFERSON COLLEGE, WASHINGTON, PA.

THE ANATOMY OF CERTAIN MUSSELS FROM THE UPPER TENNESSEE.

RY A. E. ORTMANN, PH. D.

In the Proc. Americ. Philos. Soc. 57, 1918, pp. 521–526, the present writer has published a Synopsis of the Naiades, or freshwater mussels of the upper Tennessee drainage, assigning each species its proper place in the system. But in some of them the observations on the anatomy forming the basis for the taxonomic arrangement have not been given. It is the purpose of the present paper to furnish these data, together with additional remarks on species treated previously.

I am sorry that I am compelled to introduce again nomenclatorial changes without fully supporting them; but this will be done in another paper.

FUSCONAIA PILARIS (LEA), F. PILARIS LESUEURIANA (LEA), F. PILARIS BURSA-PASTORIS (WRIGHT). (See Ortmann, l. c., pp. 527–529.)

Anatomy: *F. bursa-pastoris* (*Wr.*) in NAUTIL. 27, 1918, p. 90 (incomplete, no gravid females at hand).

Gravid females have been found subsequently on the following dates: May 11, 13, 14, '13; May 20, 22, 23, '14; July 7, 8, 13, '13. They belong in part to the var. *bursa-pastoris*, in part to the var. *lesueuriana*, but none have been found belonging to

typical *pilaris*. *Glochidia* have been observed from the earliest to the latest date, so that the breeding season begins probably very early in May, and lasts to about the middle of July (tachytictic).

In all three forms the anatomy is the same, that is to say, that of the genus *Fusconaia*, and agrees essentially with that of *F. subrotunda* (*Lea*). Also the placentae are of the same characteristic subcylindrical (not compressed or lanceolate) shape. *Glochidia* of the shape and size of those of *F. subrotunda:* subelliptical, higher than long, L. 0.13, H. 0.15 mm.

In the upper Clinch form of *bursa-pastoris*, the orange *color of the soft parts* and red color of the placentae prevail, whitish specimens being rare. The same is the case in Powell River, at least in its upper parts. Farther down in the Powell (Claiborne Co., Tenn.), specimens with whitish soft parts outnumber those with orange parts. In the lower Clinch, the specimens (*lesueuriana*-type) are nearly all whitish, and only a few with orange color have been found. In French Broad and Holston Rivers, in all three varieties, white soft parts and white placentae are the rule all the way up to the forks of the Holston and the Watauga River. Orange soft parts and red placentae are extremely rare. I have only one specimen from Grainger Co., Tenn. (*lesueuriana*-type), and one from Sullivan Co. (*bursa-pastoris*-type).

FUSCONAIA CUNEOLUS (LEA), F. CUNEOLUS APPRESSA (LEA). (See: l. c., pp. 530, 531.)

Gravid females: May 16, '15; May 22, '14; May 25, '15; July 5, 7, 8, 13, '13. *Glochidia* in specimens collected July 7 and 8. Thus tachytictic, breeding from May to July.

These two forms have the same anatomy, and belong to *Fusconaia*. They agree very well with the account given of *F. rubiginosa* (*Lea*) (=*flava Raf.*). (See: Ann. Carnegie Mus. 8, '12, p. 241.) Of nine specimens preserved, seven have a short mantle connection between anal and supraanal, while in two this is missing, but probably torn.

All four gills are marsupial, but in young specimens, the marsupial part of the inner gill is often restricted to the middle

of the gill. The ova form distinct, subcylindrical placentae. The *glochidia* are subelliptical, nearly semielliptical, about as high as long, L. and H. 0.16 mm. They are much like those of *F. flava*, but slightly larger.

Color of soft parts of the orange type, chiefly evident on the foot, mantle-margin, and adductor muscles. However, this color is not very intense, often very pale orange, and in young specimens the soft parts are sometimes whitish. The gonads are red, and so are the eggs and placentae, from pink to bright crimson; in some cases they are pinkish-orange.

This group undoubtedly represents, in the upper Tennessee, the *flava*-group of the interior basin.

Fusconaia edgariana (Lea), F. edgariana analoga (Ortm.). (See: *F. cor* and *cor analoga*, Ortmann, l. c., pp. 532–533).

Most of the specimens preserved in alcohol represent the flat headwaters-form (*analoga*), but I have a sterile female (Anderson Co., Tenn.), which is the swollen typical form.

Gravid females: May 13, 14, '13; July 5, 7, 8, '13. Of those preserved none happened to have glochidia.

Soft parts identical with those of *F. cuneolus*, and with those of the *flava*-group in general. Color in most cases deep orange, chiefly so foot and adductors. I never found specimens with whitish soft parts, and only a few are marked: pale orange. Gonads, eggs and placentae rarely pink, mostly intensely crimson.

Fusconaia barnesiana (Lea) and varieties. (See: l c., p. 534 ff.).

The anatomy of this group has been described previously. (See: Nautil. 31, '17, pp. 61, 62.)

Lexingtonia dolabelloides (Lea), L. dolabelloides conradi (Vanatta). (See: l. c., pp. 545, 546.)

Gravid females: May 11, 13, '13; July 5, 7, 9, 10, 13, '13. *Glochidia:* May 13 and July 5 (tachytictic).

All gravid specimens belong to the compressed headwaters-form (*conradi*), but I have examined the soft part of males and

sterile females of the swollen form (*dolabelloides*) of the lower Clinch and the French Broad Rivers.

The structure of the soft parts is identical with that of *Lexingtonia subplana* (*Conr.*). (See: Ortmann, NAUTIL. 28, '14, p. 28.) It differs from that of the genus *Pleurobema* chiefly in the cylindrical placentae of deep red color.

Anal and supraanal openings separated by a short mantle connection, which is sometimes absent (torn?). Branchial opening with papillae, anal with crenulations. Posterior margins of palpi connected at base. Gills broad, the inner somewhat broader than the outer. Inner lamina of inner gills free from abdominal sac except at anterior end. Outer gills marsupial; when charged very little swollen. Placentae well developed, of subcylindrical shape.

Glochidia, in the specimens preserved, all unripe, but in one of them, collected on July 5, they were sufficiently formed so as to permit examination of shape and measurements. They are subelliptical in outline, higher than long, L. 0.16, H. 0.13 mm.

Color of soft parts orange, in most cases very intensely so, chiefly the foot, adductor muscles, and mantle-margin. Rarely the soft parts are paler, and occasionally they are whitish in young specimens. Among the larger gravid females in one only the shell is marked; "pale, marsupium cream;" but the specimen clearly belongs here, as is shown by the subcylindrical placentae. Gonads, eggs and placentae generally deep red, but in a few cases, the gonads have been marked as "orange," and in a few other cases the marsupium has been marked as "pink" or "cream color." However, in two males of the swollen form from French Broad River, the soft parts were pale. This is a remarkable exception, and quite interesting in so far as also other Naiades which the normally tinted tend to assume paler color of the soft parts in French Broad River.

According to the soft parts this species is a *Lexingtonia*. I have (l. c.) mentioned the beak-sculpture of *L. subplana* as a possible additional character of this genus. In the present species this consists of a number (six to eight) of fine, rather crowded, irregular, and wavy bars, distinct only anteriorly,

becoming indistinct and effaced in the middle part. Posteriorly, upon the posterior ridge, there are a few (two to three) low, indistinct tubercles, which show no connection with the anterior bars. Thus, anteriorly, the beak-sculpture resembles that of *L. subplana*, but posteriorly it is different in the development of low tubercles.

The description of the shell, as given l. c. for the genus, should be slightly modified so as to include this species. This refers chiefly to general shape and color pattern of the shell (rays breaking up into blotches).

PLEUROBEMA OVIFORME (CONRAD), P. OVIFORME ARGENTEUM (LEA), P. OVIFORME HOLSTONENSE (LEA). (See: Ortmann, l. c., '18, pp. 550 ff.)

I have described the anatomy of the flat headwater-form (*argenteum*) under the incorrect name of *P. fassinans*. (See: NAUTIL. 28, '14, p. 31.) *Gravid females* belonging to this have been collected on the following dates: May 11, '13; May 12, '15; May 13, 14, 15, 16, 20, '13; May 20, '15; July 5, 7, 8, 9, 10, 13, 14, '13. *Glochidia* have been secured on May 11, 15, 20, and July 8 and 9. This is a tachytictic form, breeding from May to July.

Soft parts of the typical *Pleurobema*-structure, much like that of *P. clava* (Ortmann, Ann. Carn. Mus. 8, '18, p. 234). Mantle-connection between anal and supraanal openings short, sometimes absent. Anal with very fine papillae, branchial with larger papillae. Posterior margins of palpi connected for $\frac{1}{3}$ to $\frac{1}{2}$ of their length. Inner lamina of inner gills free from abdominal sac, except at anterior end. In the female, the outer gills alone are marsupial. When charged, the placentae are rather distinct, but less so when glochidia are present. They always are lanceolate and compressed, never subcylindrical. *Glochidia* subelliptical, almost subcircular, about as high as long, L. and H. 0.16 mm. (much like those of *P. clava*). Sometimes they are slightly higher than long, L. 0.15, H. 0.17 mm. (So in specimens from Chickamauga Creek, Ringgold, Ga.)

Color of soft parts whitish, often with the foot yellowish, pale brown, or pale orange, rarely also mantle-margin and adductors

pale orange or orange-brown. The eggs and placentae are whitish, cream color, pale yellow, but in most cases of a peculiar and characteristic pale orange, and also the gonads of the female often have the same color. These colors agree with those of *P. clava*, but incline more frequently to the pale orange type. It should be remarked, however, that all specimens from Little River, Blount Co., Tenn. (about a dozen) represent a peculiar color variety. The structure of the soft parts is entirely normal, but the color is of the orange type, and the placentae are bright red (in over half a dozen gravid females). The shells of these specimens do not at all differ from those of the form *argenteum* as found in Virginia, except that the color markings of the epidermis are absent, and that the latter is comparatively dark (brown to black-brown). However, all of my specimens of this form are rather large. One of my females from Chickamauga Creek had pink placentae, the others had them cream color, as is normal.

Of the *typical P. oviforme* (form of the rivers of medium size), *gravid females* have been found on May 11, 13, '13; May 20, 25, '14; July 5, 7, 9, 10, 13, '13. Glochidia are at hand from July 5.

The anatomy is exactly like that of *P. oviforme argenteum*, as described above, and the glochidia have the same shape and size (0.16 mm.).

Color of the soft parts whitish, inclining on foot and mantle often to yellowish-brown or pale orange. Ova and placentae white, more rarely cream color or pale orange. Thus, in color, this form more closely resembles *P. clava.*

Of the *swollen* type, *P. oviforme holstonense*, I have found only few specimens. No gravid females have been secured, but sterile females and males. The anatomy is exactly as in typical *oviforme.*

Note. Lexingtonia dolabelloides conradi, chiefly in young specimens, often resembles the typical *P. oviforme* in the shell. But in the color of the soft parts they are quite distinct, and the intensely orange tints seen in the former have never been observed in the latter. Gravid females of *P. oviforme* are recognized also by the light-colored placentae, which are not quite so solid a

in *Lexingtonia*, and have a lanceolate, compressed shape, so that the charged marsupial gills, even in young specimens, are considerably more swollen. The two species also differ in the beak-sculpture, which, in *P. oviforme*, consists of about four subconcentric, rather indistinct bars, which are slightly angular and nodulous upon the region of the posterior ridge; but there is no trace of the fine, wavy, and crowded bars seen on the anterior side of the beaks in *Lexingtonia*.

LASTENA LATA (RAFINESQUE). (Ortmann, l. c., p. 556.)

The description of the anatomy will be found in NAUTIL. 28, '15, p. 106.

LASMIGONA (ALASMINOTA) HOLSTONIA (LEA). (See: *Lasm. (Sulcularia) badia (Raf.)* (Ortmann, l. c., p. 557.)

The anatomy has been described in NAUTIL. 28, '14, p. 431. Additional specimens have been obtained subsequently, confirming the previous account, and furnishing more complete records for the breeding season. *Gravid females* have been collected on Sept. 6, 7, '13; Sept. 8, 12, '15; Sept. 20, '12; and in spring on May 12, '14; May 18, '15. *Glochidia* have been found as early as Sept. 20; and on the two dates in May, discharge of glochidia was observed. Thus this species is bradytictic, breeding from September to May.

ALASMIDONTA (PRESSODONTA) MINOR (LEA). (See: l. c., p. 580.)

Anatomy, see Ann. Carn. Mus. 8, '12, p. 295, and NAUTIL. 28, '14, p. 46.

Also here additional material has been secured throwing more light on the beginning of the breeding season. Dates for *gravid females* are as follows: Sept. 2, 4, 5, '14; Sept. 6, '18; Sept. 9, 11, '15; Sept. 17, 20, '12. *Glochidia* have been observed on the last two dates. This places the beginning of the season in September.

ALASMIDONTA (DECURAMBIS) RAVENELIANA (LEA). (Ortmann, l. c., p. 561.)

I have collected a number of specimens of this species in Pigeon River, at Canton, Haywood Co., N. Car., on May 14,

'14. Of three males and four gravid females, all with glochidia, two of them discharging, the soft parts have been preserved. The breeding season thus ends in May.

The anatomy is the same as that of the genus *Alasmidonta*, as described previously (Ann. Carn. Mus. 8, '12, p. 297), also with regard to color (inclining to yellowish and orange tints). It should be mentioned that the inner lamina of the inner gills is, in two males and two females, entirely connected with the abdominal sac (as is the case in *A. marginata*); but in one male and two females, it is free in the posterior half or one-third of the abdominal sac. The specimens with the inner lamina partly free are the smaller ones.

Glochidia as usual, triangular, with hooks, about as high as long, L. and H. from 0.29 to 0.32 mm. Thus they are smaller than those of *A. marginata*, where the L. is 0.33, the H. 0.36 mm.

Pagias fabula (Lea). (Ortmann, l. c., p. 562.)

Anatomy described in Nautil. 28, '14, p. 65. *Gravid females*, with *glochidia*, were at hand, collected on Sept. 17, '12. An additional gravid female, with eggs, has been found on Sept. 7, '13. This indicates the beginning of the breeding season in September.

Ptychobranchus subtentum (Say). (See: *Ellipsaria subt.*, Ortmann, l. c., p. 564.)

The soft parts have been described in Ann. Carn. Mus. 8, '12, p. 308, fig. 5. Many specimens have been secured subsequently, confirming this account. It should be added that large females show that the folds of the marsupium are more numerous, and occupy nearly the whole outer gill.

Gravid females have been found frequently from Sept. 5 to Sept. 21, but with eggs only, indicating the beginning of the season; on May 20, '13, females discharging placentae with glochidia have been observed, indicating the end of the season.

Dromus dromas (Lea), D. dromas caperatus (Lea). (l. c., p. 566.)

Anatomy: Ann. Carn. Mus. 8, '12, p. 315, figs. 18, 18a, 18b. The soft parts of the var. *caperatus* are absolutely identical

with those of the main species. The color of the marsupium is mostly red, more rarely white.

Gravid females of the variety have been found on Sept. 7, 8, '14; Sept. 16, 17, 21, '15, mostly with eggs, but already on the earliest date a specimen with *glochidia* was seen. The latter have the same shape as those of the main species, L. 0.18, H. 0.09 mm.

ACTINONAIAS PECTOROSA (CONRAD). (l. c., p. 569.)

Anatomy: Ann. Carn. Mus. 8, '12, p. 325 (as *Nephronaias perdix*).

Gravid females have been found on Sept. 11, 15, '13; Sept. 15, '15; Sept. 17, '12; Sept. 17, '13, all with eggs. *Glochidia* have been found on May 12, '13, and May 20, '14, being discharged on the last date. Thus the breeding season is from September to May.

CARUNCULINA MOESTA (LEA). (See: *Toxolasma lividum* (*Raf.*) Ortmann, l. c., p. 578.)

This form is the upper Tennessee representative of *C. glans*, but I have a set of an absolutely identical form from the Ozark region (James River, Galena, Stone Co., Mo., collected by A. A. Hinkley), recorded by Hinkley (Proc. U. S. Mus. 49, '15, p. 588) as *Lampsilis glans*, and I shall include these specimens in the following report.

I have described (NAUTIL. 28, '15, p. 142) the anatomy of a sterile female of *C. glans*. Among the specimens of *C. moesta* from the Ozarks, there are males, sterile females, and one gravid female with glochidia, collected July 30, '14. From the upper Tennessee region, I also have males and sterile females, and a gravid female with glochidia, the latter collected on May 16, 15.

Thus the breeding season of this form is rather obscure. We should expect it to be bradytictic, and the specimen collected in May would agree with this. However, the presence of glochidia at the end of July appears strange; this specimen was discharging, and it might be a case of belated discharge. On the other hand, the beginning of the preceding season can not fall very early in autumn, for among a considerable number of

females found by myself on Aug. 31, '14, not a single gravid one turned up. Wilson and Clark (Bur. Fisher. Doc. 758, '12, p. 48) report glochidia in July for *C. glans*.

All specimens examined have the same anatomical structure agreeing with that of *C. glans*. The caruncle of the mantle-margin generally is brown, lighter or darker, varying to white or blackish. Its shape is short subcylindrical or hemispherical. The edge of the marsupium has black-brown pigment. The *glochidia* are subovate, higher than long, L. 0.17 to 0.18, H. 0.19 to 0.20 mm., thus agreeing with those of *C. parva*, as described previously (NAUTIL. 28, '15, p. 181).

CONRADILLA CAELATA (CONRAD). (See: *Lemiox rimosus* (*Raf.*). Ortmann, l. c., p. 574.)

Anatomy: see NAUTIL. 30, '16, p. 39. The nomenclature will be discussed elsewhere. The new generic name *Conradilla* takes the place of *Lemiox Raf.*, used in the publications referred to.

MEDIONIDUS CONRADICUS (LEA). (See: *Medionid. plateolus* (*Raf.*) Ortmann, l. c., p. 575.)

Anatomy: see Ann. Carn. Mus. 8, '12, p. 335, fig. 22, and NAUTIL. 28, '15, p. 142. A misprint in the latter paper should be corrected; the L. of the glochidium is 0.22 mm., not 0.28.

The breeding season is now rather well known; gravid females are found from the beginning of September (earliest date Sept. 6), and glochidia as early as Sept. 13; discharge of glochidia has been observed in numerous cases from May 11 to May 20.

EURYNIA (MICROMYA) PERPURPUREA (LEA). (Ortmann, l. c., p. 576.)

Anatomy: see NAUTIL. 29, '15, p. 68.

Immature glochidia have been found on Sept. 5, '18, mature ones on Sept. 21, '12.

EURYNIA (MICROMYA) NEBULOSA (CONRAD). (Ortmann, l. c., p. 577.)

Anatomy: see NAUTIL. 29, '15, p. 64.

Investigation of additional specimens has confirmed the char-

acters given previously. I have collected *gravid females* as early as Aug. 31. *Glochidia* were observed first on Sept. 2, so that the breeding probably begins toward the end of August. Discharge of glochidia has been seen from May 11 to May 24, and a single discharging female was found on July 5, probably exceptionally belated. My extreme measurements of the *glochidia* are: L. 0.21 to 0.23, H. 0.27 to 0.30 mm.

EURYNIA (MICROMYA) VANUXEMENSIS (LEA). Ortmann, l. c., p. 530.)

Anatomy: see Ann. Carn. Mus. 8, '12, p. 342, and NAUTIL. 29, '15, p. 65.

Earliest date for gravid females Sept. 2; for glochidia Sept. 17. Discharge from May 15 to May 25.

(The species of the genus *Truncilla* will be treated in a separate paper.)

MODIOLUS DEMISSUS DILLWIN, IN SAN FRANCISCO BAY.

BY G. DALLAS HANNA.

One of the supposedly accidental introductions of animal life from the east to the west coast of North America with the extensive attempts to transplant the oyster was the plicated mussel, *Modiolus demissus.* It was first recorded from the new location by Stearns in 1899 (NAUTILUS, XIII, p. 86) from specimens collected by R. N. Drake in 1894 at a point "3 miles north of Stanford University," that is, the southern part of San Francisco Bay. The record was repeated by the same author in April, 1900 (*Science,* n. s., XI, p. 658).

"Fine specimens" were again collected, apparently from the same colony, by Doe and Gifford, and recorded by Keep in April, 1901 (NAUTILUS, XIV, p. 115). In his "West Coast Shells," Revised edition, p. 37, 1911, the same author states, "It doubtless came to California with seed oysters which were planted in San Francisco Bay, where it may now be found in considerable numbers."

In his checklist Dall merely states that it is found on the oyster beds of the Bay (*Checklist of Recent Bivalve Mollusks of the N. W. Coast*, p. 18, 1916).

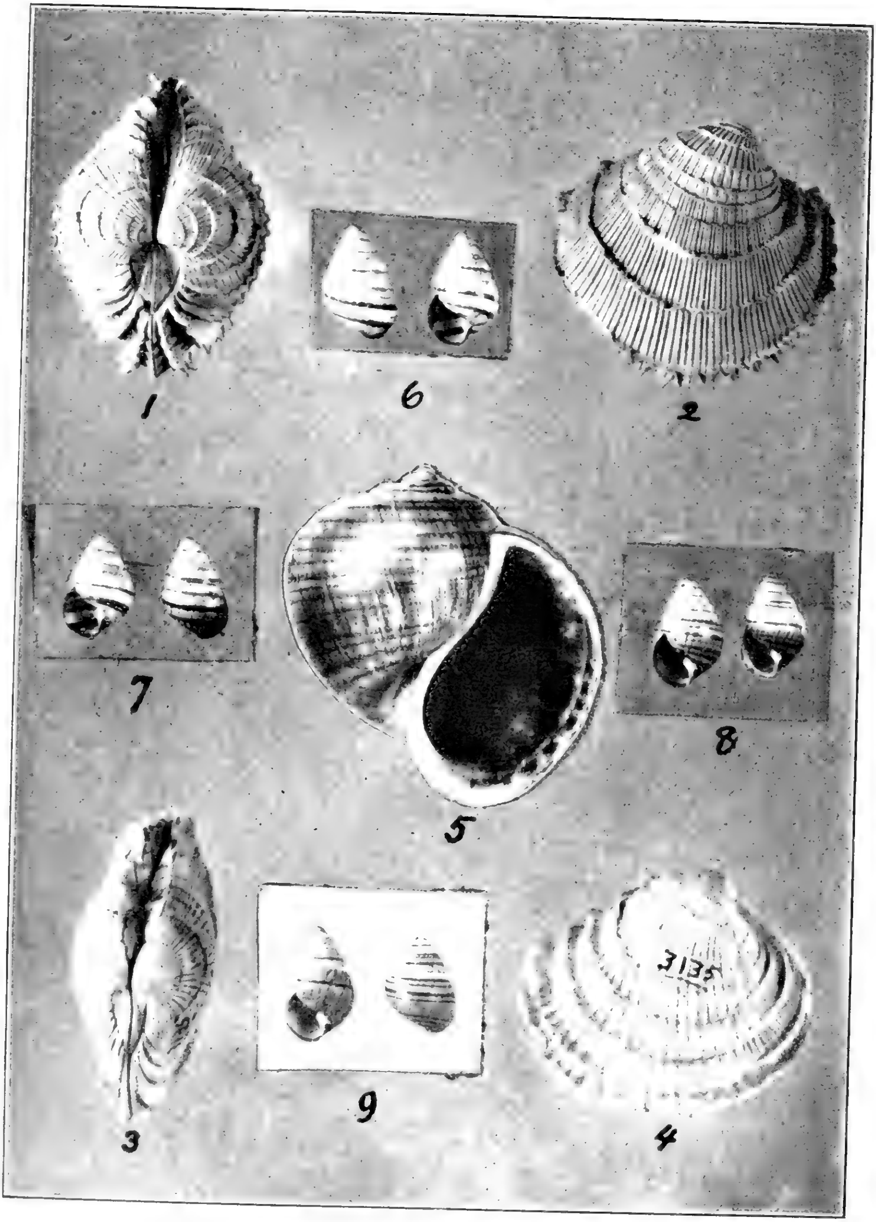
Packard (*Univ. of Calif. Publ. Zool.*, Vol. 14, No. 2, p. 257, 1918) states in his report on the mollusca obtained by the U. S. Bureau of Fisheries Survey of San Francisco Bay that, "Although it was not taken by the Survey it is reported to occur within the lower division of the Bay in sufficient numbers to be marketed occasionally."

The above is a review of all of the published records of the species on the west coast which are known to the writer. Mrs. Ida S. Oldroyd tells me she received specimens some years ago collected by Fred L. Button at Alameda. Henry Hemphill made wonderful discoveries during his extensive collecting on the eastern side of the Bay, among other things, the sand clam, *Mya arenaria*, but his collection does not contain a specimen of the plicated mussel from any west-coast locality. So it may be inferred that he did not find it.

Its extensive spread in the bay region however cannot be doubted. Through Mr. R. A. Coleman the California Academy of Sciences recently received 18 beautiful specimens of this mussel. They were taken at Bay Farm Island about one mile south of Alameda on the eastern side of the Bay. They were found living on the mud flats in very considerable numbers attached to the roots of *Spartina stricta maritima*, determined by Miss Alice Eastwood, locally known as wild rice. It is said to be occasionally brought into the markets from this locality.

Mr. Coleman states that the mussels were delicious eating. Many of the shells are over a hundred millimeters long and as much as fifty millimeters wide. The epidermis has a very high polish and the umbones have been only slightly eroded, in many cases none at all.

Those persons anxious to learn how long it takes to develop a variety, subspecies or species may well keep watch of *Modiolus demissus.*



1, 2. CHIONE GNIDIA B. & S.
3, 4. CHIONE MERIDIONALIS OLDROYD.
5. AMPULLARIA LATTREI CHAMANA HINKLEY (p. 53).
6–9. ACHATINELLA LEHUIENSIS MEINECKEI PILS. & COOKE.

A NEW PERUVIAN CHIONE.

BY IDA S. OLDROYD.

Chione meridionalis n. sp. Plate IV, figs. 3, 4.

Shell of medium size, somewhat triangular elongate, quite flat; concentrically laminated, the laminæ crenated, erect, ten in number, evenly spaced; interstices radiately ridged with fine ribs bundled in threes, evenly spaced. Ligamentary area very broadly excavated, with brown markings. Lunule narrow, elongate, faintly marked with brown and circumscribed by an incised line. Nymphs smooth, like young *C. gnidia*. Teeth smooth. Valve margins crenulate. Ligament inset, but showing externally. Color cream-white, with brown marking, interior white.

It is something like a young *C. gnidia* in sculpture, but the laminæ are not scalloped as in that species, and it is a small shell compared with that. It is elongate, while *C. gnidia* is ovate. The accompanying plate will show the difference in the two species. Figures 1 and 2 are *C. gnidia*.

Type locality, Peru. The type is in the University of California Museum, locality number 3135. One specimen is in the Stanford University collection.

LAND SHELLS OF SOUTHERN FLORIDA.

BY E. G. VANATTA.

The following species of land shells were picked from leaf-mould collected by Mr. Clarence B. Moore in Southern Florida during the winter of 1919 and 1920, at stations not recorded in The Nautilus volumes XIX (1905), page 40; XXI (1908), page 99; XXVI (1912), pages 16, 31; XXXIII (1919), page 18.

All the records of *Bifidaria contracta* Say in those lists should be changed to *Gastrocopta contracta peninsularis* Pils., which differs from the typical *contracta* as indicated on page 17 of The Nautilus, Vol. XXVI (1912).

Opeas pumilum Pfr. has not been recorded from Florida before.

Pumpkin Key, Lee County, Florida.

Helicina orbiculata Say.
Polygyra c. carpenteriana (Bld.).
Thysanophora plagioptycha (Shutt.).
Microceramus floridanus Pils.
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Gastrocopta c. peninsularis Pils.
Polita indentata (Say).
Guppya gundlachi (Pfr.).
Euconulus chersinus (Say).

Shell Key (Gomez Old Place), Lee County, Florida.

Helicina orbiculata Say.
Polygyra c. carpenteriana (Bld.).
Liguus f. roseatus Pils.
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Guppya gundlachi (Pfr.).

Dismal Key, Lee County, Florida [THE NAUTILUS, XXI (1908), 100].

Opeas pumilum Pfr.

Buttonwood Key, Lee County, Florida [THE NAUTILUS, XXI (1908), 100].

Truncatella bilabiata Pfr.
Zonitoides minuscula (Binn.).

Watson's Place (a Key), Chatham River, Monroe County, Florida.

Polygyra c. carpenteriana (Bld.).
Gastrocopta rupicola (Say).
Zonitoides arborea (Say).
Zonitoides m. alachuana (Dall).
Zonitoides singleyana (Pils.).

Lopez Place (a Key), Monroe County, Florida.

Polygyra c. carpenteriana (Bld.).
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Zonitoides m. alachuana (Dall).
Zonitoides singleyana (Pils.).

Hamilton Place, Lossman River, Monroe County, Florida.

Truncatella bilabiata Pfr.
Polygyra c. carpenteriana (Bld.).
Thysanophora plagioptycha (Shutt.).
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Gastrocopta c. peninsularis Pils.
Euglandina rosea (Fér.).
Guppya gundlachi Pfr.
Zonitoides arborea (Say).
Zonitoides m. alachuana (Dall).
Zonitoides singleyana (Pils.).

Lossman's Key, Monroe County, Florida [see NAUTILUS, XXVI (1920), 20].

Truncatella bilabiata Pfr.

Chevalier Place (a Key), Chatham River, Monroe County, Florida.

Helicina orbiculata Say.
Polygyra c. carpenteriana (Bld.).
Polygyra uvulifera (Shutt.).
Thysanophora selenina (Gld.).
Thysanophora plagioptycha (Shutt.).
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Gastrocopta c. peninsularis Pils.
Polita indentata (Say).
Euconulus chersinus (Say).
Zonitoides arborea (Say).
Zonitoides minuscula (Binn.).

Gopher Key, Monroe County, Florida.

Helicina orbiculata Say.
Polygyra c. carpenteriana (Bld.).
Polygyra uvulifera (Shutt.).
Thysanophora selenina (Gld.).
Thysanophora plagioptycha (Shutt.).
Microceramus pontificus (Gld.).
Liguus c. lossmanicus Pils.
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Gastrocopta c. peninsularis Pils.
Polita indentata (Say).
Guppya gundlachi (Pfr.).
Zonitoides arborea (Say).
Zonitoides minuscula (Binn.).
Zonitoides singleyana (Pils.)

THE LEAPING RAZOR SHELL.

BY JAMES SHEPARD.

In making a tour throughout the length of Cape Cod in company with my daughter, C. Antoinette Shepard, we arrived at Wellfleet, Mass., on the afternoon of August 30, 1882. We had been on the beach but a short time when we beheld a sight such as we had never before witnessed. The tide was well out, and on the bare sand some rods from the water we noticed numerous small objects leaping up into the air from place to place and in various directions. We knew of nothing which would be likely to be moving about in that manner. Making our way hastily towards them, we found that those nearest to

us disappeared from sight. Consequently we proceeded more cautiously. Much to our surprise and delight these strange objects proved to be a colony of Razors (*Solen ensis*) roaming over the beach apparently having a frolic. By a strong and quick stroke of their foot they threw themselves up into the air and from place to place. They ascended something like two feet or more above the sand and leaped not less than three feet at one jump. Almost immediately after having landed on the beach at the end of one leap they leaped again, sometimes in one direction and sometimes in another. When their successive leaps were in the same general direction, as they most frequently were, they traveled over the beach about as fast as a person would ordinarily walk. We attempted to catch those which were the nearest to us, running for them as they were about to fall flat on the sand. They curved their foot downwardly, planting the end firmly in the sand and then by a straightening out of the foot rose from a prostrate to an upright position preparatory to boring a new burrow and sinking down into the sand with wonderful rapidity. They were so quick in their movements, that although we were with them for about two hours we were not able to catch hold of one before it had commenced boring into the sand. We succeeded in capturing a few, only a very few, without injuring the shell. These few we grasped when the end of the shell had penetrated the sand something less than one inch. In case the shell had penetrated the sand a full inch or more at the time we grasped them, it was impossible to pull one out without crushing the shell. In our several attempts to do so we not only crushed the shell but also tore the animal asunder, securing only a part of it while the rest remained in the sand.

I cannot state how many live Razors we saw that day, but there seemed to be no end of them. We could conceive of no reason as to why so many Razors were then out of their holes, other than that they came out of their own free will as I am confident that they did. But I find at least two scientific publications in which it is stated that "They never voluntarily leave their burrows." One English work is more conservative and probably correct in its statement that "the Solens rarely leave their burrows voluntarily."

I have never had the pleasure of seeing a live Razor excepting on my visit to Wellfleet.

SPECIES NAMED IN THE PORTLAND CATALOGUE: I, AMERICAN.

BY WILLIAM HEALEY DALL.

Daniel Solander, a pupil of Linnaeus, came to London in search of fortune, where he died in 1783, at the age of forty-seven years.

During his residence he was employed by Sir Joseph Banks to classify the Banksian Collection, afterward included in the British Museum. He also was engaged in arranging and classifying the conchological part of the remarkable collection gathered by Margaret Cavendish, Dowager Duchess of Portland. This collection is chiefly remembered by its connection with the funeral urn of Alexander Severus, then known as the Barbarini vase, purchased at the sale by the British Museum, renamed the Portland vase, later smashed by a precursor of the militant suffragettes, and wonderfully put together again from its fragments by patient work.

Solander named many nondescript shells in the Banksian Collection, and his manuscript furnished Dillwyn with many names or synonyms for his Catalogue of 1817.

After the death of the Duchess in 1785, her conchological collection, with other zoological, artistic, and historical items, was sold in the following year, and where Solander had named an undescribed species with reference to a figure in one of the earlier iconographies, this name is published in the catalogue prepared by an anonymous compiler and printed in April, 1786. Many of these names were afterward adopted, mostly without acknowledgment, by Bolten, Lamarck, and other later writers. The best known among the American species is our common *Unio complanatus*. The death of Solander before the publication of any of his new names leaves them dependent upon the Catalogue above mentioned and the citations of Dillwyn.

A few of the names are accompanied by a descriptive phrase,

but most of them depend for their status on the citation of figures.

The anonymous editor of the Catalogue added a few names on his own account and was apparently a conchologist of some note, but from his classification evidently not E. M. Da Costa. According to Dillwyn (1817) it was George Humphrey.

The following list comprises all the American species receiving names in the Catalogue. Those followed by an S are Solander's, the others are by the anonymous compiler. I have included the references to the figures which appear in the Catalogue.

It is curious that in the British Cyclopedia of Biography, in which so many nonentities find a place, no reference is made to the Duchess who was such a munificent patron of art, archaeology and science in her day.

The only typographical error to be noted in the work is the confusion by the printer of the names of Martini and Martyn, but the references make it clear in every case which is meant. None of these names are included in Sherborn's Index Animalium, 1758–1800.

Arca fusca S., p. 42, No. 1001, Jamaica, W. I. Gualtieri 87–G.

+*Arca fusca* Bruguière, 1789.

Buccinum monodon S., p. 17, No. 372, Tierra del Fuego. Also p. 139, No. 3093. Martyn, Un. Conch., f. 10.

=*Buccinum calcar* Martyn, 1784.

Buccinum neptuni S., p. 29, No. 668; p. 35, No. 859; p. 174, No. 3746. The West India Trumpet shell.

Murex tritonis Lin. *ex parte*, +*Tritonium neptuni* Bolten, 1798.

Buccinum testudo S., p. 98, No. 2148. Seba III, t. 70, f. 2–4.

+*Cassis inflata* Shaw, 1790.

Bulla vesicaria S., p. 136, No. 3030; p. 142, No. 3158. West Indies. Seba III, pl. 38, f. 46, 48.

=*Hydatina physis* L., 1758.

Cardium robustum S., p. 58, No. 1358; p. 162, No. 3517. Great American Cockle from Florida. Lister, Conch. 328, 165.

+*C. magnum* Born (not Linné), 1780, and *C. ventricosum* Bruguière, 1789.

Helix ovipara, p. 155, No. 3388; Surinam; p. 174, No. 3745, St. Vincent's.

a. Lister, 1055, I. =*Bulimus ovatus* Müller, 1774.

b. Lister, tab. 23. White margin to mouth.

=*Bulimus oblongus* Müller, 1764?

Helix picta, p. 182, No. 3900. Terrestrial shell from the West Indies. Rumphius, Thesaurus, 22, 1, 1739.

+*Helix picta* Born, 1780.

Helix undata, p. 177, No. 3802; p. 183, No. 3924. Lister, 76; Favanne, tab. 63, f. G 3.

+*Helix pellis-serpentis* Shaw, 1790, and *Solaropsis brasiliensis* Beck.

Mactra procera S., p. 24, No. 559. Great American Mactra from New York.

+*Hemimactra solidissima* Dillwyn, 1817.

Murex plicatus S., p. 104, No. 2284. Falkland Islands (Not of Gmelin, 1792). Favanne, tab. 79, f. I.

+*Trophon patagonicus* Orbigny, 1841, as *Murex*.

Mya complanata S., p. 100, No. 2190. Maryland. Lister, 150, 5.

=*Unio complanatus* S.

Ostrea grandis S., p. 50, No. 1186; p. 99, No. 2168. Great American compass Pecten from Halifax, North America.

+*Pecten magellanicus* Gmelin, 1791–2.

Ostrea elongata S., p. 55, No. 1303; p. 151, No. 3312. Purple spot oyster from Virginia.

+*Ostrea virginica* Gmelin, 1791–2.

Solen plebeius S., p. 42, No. 1005 (bis). Barbados. Lister, Conch. 421, f. 265.

+*Tagelus gibbus* Spengler, 1794.

Tellina cruenta S., p. 58, No. 1360. Knorr, VI. t. 12, f. 1.

+*Sanguinolaria sanguinolenta* Gmelin, 1791–2.

Tellina marginalis S., p. 137, No. 3049. Lister, Conch. 387.

=*Tellina laevigata* Linné, 1758.

Trochus alveolatus S., p. 52, No. 1240. Beehive snail. Lister, Conch. 62, 60. Jamaica.

=*Helix epistylium* Müller, 1774.

Venus nimbosa S., p. 175, No. 3761. Florida. Favanne, t. 49, f. I1.

+*Macrocallista gigantea* Gmelin, 1791–2.

Voluta ancilla S., p. 84, No. 1873; p. 137, No. 3061. Straits of Magellan. D'Avila, I, pl. 8, f. s.

Voluta angulata S., p. 76, No. 1711. Martini, Conch. Cab. IV, f. 1325.

+*Turbinella scolymus* Gmelin, 1791–2.

Voluta brasiliana, p. 186, No. 3958. Brazil. Large undescribed species with only two plaits on the column.

+*V. brasiliana* Lamarck, 1811.

Voluta muricata S., p. 142, No. 3142. West Indies. Lister, Conch. 810, 19.

+*Turbinella muricata* Born, 1780.

Voluta virescens S., p. 26, No. 610; Guinea; p. 136, No. 3020; p. 174, No. 3751. Martini, Conch. Cab. III, f. 942, 933.

+*Voluta polygonalis* Lamarck, 1811, *fide* Pfeiffer.

COLLECTING AT NAHANT BEACH, MASS.

BY LILLIAN DYER THOMPSON.

Nahant Beach, very often incorrectly called Lynn Beach, lies just the other side of the boundary line between Lynn and Nahant. This beach is in the shape of an extremely large crescent, and is of the finest quality of sand. On this beach, which fronts the ocean, I collected eleven species one afternoon, while in the rock pools of Little Nahant which tip one end of the beach, we found eleven other species. The rock pools we visited are exactly opposite Egg Rock, and are on the Atlantic side of Little Nahant. In these rock pools I have found many

varieties of crabs and sea anemones, besides many species of mollusks.

The following is a list of species collected on the beach and in the tide pools. Those with the asterisk were found dead.

On the Beach.

Neptunea decemcostata Say.*
Polinices heros Say.
Polinices duplicata Say.*
Alectrion trivittata Say,*
Colus stimpsoni Morch.*
Buccinum undatum Linn.*
Ensis directus Conr.
Modiolus modiolus Linn.*
Solemya borealis Totten* (perfect).
Cyprina islandica Linn.*
Spisula solidissima Dillw.*
Siliqua costata Say.*
Tellina tenera Say.*
Petricola dactylus Sowerby.*
Lyonsia hyalina Conrad.*

In the Rock Pools.

Litorina littorea Linn.
Litorina palliata Say.
Litorina rudis Donovan.
Lacuna vincta Montg.
Thais lapillus Linn (banded and plain).
Acmaea alveus Conrad.
Acmaea testudinalis Müll.
Crepidula fornicata Linn.
Saxicava arctica Linn.
Mytilus edulis Linn.

WILLIAM WILDER.

We regret to record the death of Mr. Wilder in Honolulu, July last. For some years he had been collecting Hawaiian land shells, especially the tree shells, Achatinellidae and Auriculella, and had brought together a valuable collection. Mr. Wilder is shown collecting Achatinellas in a photograph by Irwin Spalding, published in NAUTILUS for July last, Plate II. We understand that his collection will be secured for the Bishop Museum, Honolulu.—H. A. P.

THE LAND MOLLUSKS OF THE BELGIAN CONGO.*

BY T. D. A. COCKERELL.

The American Museum of Natural History has issued a series of reports on its Congo Expedition, all characterized by fullness of treatment and abundant and beautiful illustrations. Other similar reports are in course of preparation. The completed series will constitute a guide to the zoology of equatorial Africa, full of interest for the general naturalist and evolutionist, as well as for specialists in the several departments. Among these reports one of the most interesting is that on the Land Mollusks, by Dr. Pilsbry. The presentation of the subject is so clear and complete, and the illustrations are so good, that the reader has no difficulty in understanding the characters of the fauna, though he may have known very little about it before. To one accustomed to the mollusks of America or Europe, the tropical African series seems to belong to another world. Even when there is a certain similarity of form, as among the Helicidæ, the anatomy shows that we are dealing with strange generic types. The closest affinity is of course with the fauna of the Oriental region, yet even that is remote, although some doubtless very ancient genera range through tropical Asia and Africa. There is here a rather close parallel between the distribution of the land mollusks and the fresh-water fishes. Certain genera of fishes, but with distinct species, occur in the fresh waters of India and of tropical Africa, but the latter region has many remarkable types of its own, in some cases much more allied to neotropical genera than to anything in India. It is evident that Africa, the land of the okapi and the tsetse fly, is a storehouse of ancient groups of animals, some of which at least, were formerly much more widely spread. While we thus emphasize the probable antiquity of various African groups or genera, we find remarkable specific diversity, apparently indicating that

* Henry A. Pilsbry. A Review of the Land Mollusks of the Belgian Congo, chiefly based on the collections of the American Museum Congo Expedition, 1909-1915. Bulletin American Mnseum of Natural History, Vol. XL, p. 370, 23 plates (8 colored), 1919.

the evolutionary process has been active during the latest geological periods. While the Belgian Congo has of course been only very imperfectly explored for land mollusks, about 500 localities are represented, and about 390 species and races have been found. Of these 390 forms, I find 214 reported from one locality only. The case is even stronger than these figures suggest, as when two or more localities are given, they are often only short distances apart, or perhaps in some cases different names for essentially the same place. Again, of 214 species and subspecies in the collection reported on, 160 required new specific, racial or varietal names. When we consider the amount of specific and racial diversity thus indicated, making full allowances for our imperfect knowledge of the distribution of the recorded species, it becomes evident that the total existing fauna must amount to some thousands at least.

It is well known that the high mountains of tropical Africa are inhabited by certain organisms, especially plants, very closely related to Palæarctic species. In the case of the plants, at least, it is possible that the seeds were brought by birds. Among the mollusks, it is interesting to find a *Vitrina* high up on Mt. Ruwenzori, near the line of perpetual snow. But after all this is not a typical *Vitrina*; it differs in the less extensive mantle, the sculpture of the shell, and in the teeth. Dr. Pilsbry accordingly establishes for it a subgenus *Calidivitrina*,—the name rather unfortunately chosen, since it is not an inhabitant of the hot lowlands. On comparing the Congo mollusks with those of tropical Asia, some puzzling questions arise. Thus among the slugs there are such similarities that Godwin-Austen formerly placed both African and Indian species in his genus *Africarion*. He now agrees that the Indian slugs constitute a quite distinct genus (*Pseudaustonia*), and it seems at least probable that the Indian series has undergone an evolution similar to, but quite independent of, the African. These conclusions could never have been reached without a study of the soft anatomy, and thus we are led to treat with some caution those cases of similarity among the smaller shells, the anatomy being unknown. There is, for example, a striking resemblance between some of the African and Oriental species of the *Gulella*

species, but they may well represent independent developments, especially since they also superficially resemble Pupillidæ, to which they are not at all related. Thus the tendency of modern research will probably be to emphasize rather than diminish the separateness of the Ethiopian fauna.

It is rather a shock, at first, to see the African slugs heretofore called *Veronicella* or *Vaginula* referred to *Lævicaulis* and *Pleuroprocta*, names proposed several years ago by Simroth. It can hardly be doubted, however, that the Veronicellidæ must be held to include a number of genera, in spite of the great external similarity. Dr. Pilsbry is in error, I think, in calling the family Vaginulidæ, on the stated ground that the type of *Veronicella* has not been rediscovered. As a matter of fact the actual specimen described by Blainville is still to be seen in the British Museum, as was explained in Conchologist, 1893, pp. 43–44. It was collected by Sloane in Jamaica, and is properly called *Veronicella sloanii* (Cuvier).

PUBLICATIONS RECEIVED.

THE JOURNAL OF CONCHOLOGY, Aug., 1920, Vol. 16, No. 4.

Census Authentications. By the late W. D. Roebuck, p. 101.

"Ground" Clausilias. By Rev. A. H. Cooke, p. 102.

Note on Conus chytreus Melvill. By A. T. Hopwood, p. 103.

Notes on Kentish Mollusca. By H. C. Huggins, p. 104.

The Land and Freshwater Mollusca of Audruicq, Pas-de-Calais. By Jno. W. Taylor, pp. 106–117.

Editorial Notes, p. 125.

The Non-marine Mollusca of Llandudno and District. By H. Beeston, pp. 128–132.

PROCEEDINGS OF THE MALACOLOGICAL SOCIETY OF LONDON, Sept., 1920, Vol. 14.

Notes on Marginella guttula Sowerby. By John Shirley, p. 51.

Presidential Address—The Armature of Land Mollusca. By G. K. Gude, pp. 52–73.

Note on Xylophaga praestans Smith. By J. R. LeB. Tomlin, p. 73.

Concerning Edenttellina. By Charles Hedley, pp. 74–76. *E. corallensis* n. sp., p. 76, figs. 6–8.

Nomenclatorial Notes Relating to British Non-marine Mollusca. By A. S. Kennard and B. B. Woodward, pp. 77–90.

The Anatomy of two species of Helicarion from Tropical Africa. By Hugh Watson, pp. 91–118, pls. 3 & 4. *H. cryptophallus* n. sp., p. 97, pl. 4.

Mitra burnupiana n. sp., from South Africa. By Rev. A. H. Cooke, p. 114.

Note on the dates of publication of the earlier parts of Captain Thomas Brown's Illustrations of the Conchology of Great Britain and Ireland. 2nd edition. By Alexander Reynell, p. 116.

Correlation of Shape and Station in Freshwater Mussels (Naiades). By A. E. Ortmann. (Proc. Amer. Phil. Soc., 1920, Vol. 19, pp. 269–312.) The author has ascertained "that the more obese (swollen) form is found farther down in the larger rivers, and passes gradually, in the upstream direction, into a less obese (compressed) form in the headwaters; with the decrease in obesity often an increase in size (length) is correlated; a few shells which have in the large rivers a peculiar sculpture of large tubercles, lose these tubercles in the headwaters." The observations were made in the headwaters of the Ohio and Tennessee Rivers.

Variation in Nacreous Color of Certain Species of Naiades Inhabiting the Upper Ohio Drainage and their Corresponding Ones in Lake Erie. By N. M. Grier (Amer. Midland Nat., 1920, pp, 211–243, Vols. 2–3). In a summary the author says "In practically all the species dealt with a change in nacreous color is observed going down stream from the headwaters to the mouth. . . The shells of L. Erie have a greater

proportion of blues among them than the corresponding shells in the Upper Ohio Drainage.

Light Production in Cephalopods. By S. Stillman Berry (Biol. Bull., 1920, Vol. 28, pp. 141–195). An Introductory Survey.

Notes on Some Undescribed Californian Helices. By S. Stillman Berry (Proc. Cal. Acad. Sci., 4 ser., Vol. 10, pp. 53–70, pls. 4–6, 1920). Five new subspecies of Epiphragmophora are described and figured.

Fossil Mollusks from the John Day Basin in Oregon. By G. Dallas Hanna (Univ. Oregon Publication, Vol. 1, No. 6, 1920). Two new species are described and figured.

Report of Cephalopods Collected During 1906 by the U. S. Bureau of Fisheries Steamer "Albatross" in the Northwestern Pacific. By Madoka Sasahi (Prac. U. S. Nat. Mus., Vol. 57, pp. 163–203, pls. 23–26, 1920). The paper contains descriptions of 18 new species, three new genera *Watasella*, *Chunella* and *Gonatopsis*, and two new families *Watasellidae* and *Eledonellidae.*—C. W. J.

A Monograph of the East American Scaphopod Mollusks. By John B. Henderson (U. S. Nat. Mus., Bull. III, 1920, pp. 1–177, pls. 1–20). This excellent monograph is based upon the material contained in the National Museum, including much dredged by the author, together with the American Scaphopods of the Philadelphia Academy and the Mus. Comparative Zoology. Practically all of the East American material extant has therefore been studied. The classification is that of Pilsbry and Sharp, with the addition of a new subgenus of *Cadulus:* Platyschides, type *C. grandis* Verrill.

The specific distinctions of these simple shells are worked out with admirable clarity, in the descriptions and keys for determination. All of the species and subspecies are illustrated. 98 species, about one-third of them new, with numerous sub-

species, are recognized. In the Introduction a historical sketch is given, and an interesting account of the geographic distribution.—H. A. P.

NOTES ON A COLLECTION OF SHELLS FROM TRINIDAD, CALIFORNIA. By Eric Knight Jordan (Proc. U. S. Nat. Mus., Vol. 58, pp. 1–5). Two new species of *Odostomia, O. euglypta* and *O. edmondi,* are described.

A NEW FRESHWATER MOLLUSK FROM INDIANA. By Bryant Walker (Proc. U. S. Nat. Mus., Vol. 57, p. 525). *Ferrissia bartschi,* from Lake Maxinkuckee.

NOTES.

TAPES PHILIPPINARUM IN THE HAWAIIAN ISLANDS. My information concerning *Tapes philippinarum* differs much from Bryan's in NAUTILUS, XXXII, p. 124. A Japanese now living in Honolulu has twice planted this bivalve on the mud flats at Moanalua on Oahu. The first planting did not survive long; the second maintained itself in fine shape up to the present day, when they are abundant enough to be gathered and put on sale in the markets. They are frequently imported from Japan to Honolulu by the barrel for sale among the Japanese. I send you some of these imported shells.—D. THAANUM.

M. EUGENE AUBOURG DE BOURY died on April 17, in France, at the age of sixty-three years. A correspondent writes that M. de Boury, though a long-time invalid, had devoted himself with ardor to the study and collection of mollusks of the genus *Scalaria.* He gathered in the last ten years an extraordinary collection of these beautiful and rare shells for the Paris Museum of Natural History, increasing their series from 300 sets to 3000, exclusive of photographs and illustrations of inaccessible species to the number of 1800 more. This series far surpasses any other extant. He published numerous papers on the genus and indicated many new subdivisions of it, but the great monograph which was his ideal must remain for other hands to prepare.—(*Science.*)

LAND SHELLS OF CHOKOLOSKEE KEY AND CAPE SABLE, FLORIDA.—Have just run across a big lot of *Liguus* and *Oxystyla* that Simpson sent me 3 or 4 years ago and in cleaning them up I shook a small amount of dirt out of a bunch from Chokoloskee Key which yielded the following species. You will note that only two of them are in Vanatta's list, NAUTILUS, XXI, p. 100.

Chondropoma dentatum (Say).
Truncatella caribaeensis "Sby." Rve.
Truncatella bilabiata Pfr.
Lucidella tantilla (Pils.).
Thysanophora inaguensis (Weinl.).
Thysanophora plagioptycha (Shutt.).
Gastrocopta contracta (Say).
Gastrocopta rupicola (Say).
Gastrocopta p. hordeacella (Pils.).
Varicella gracillima floridana Pils.
Euglandina rosea, near *parallela* (Binn.).
Polita dalliana ("Simp." Pils.)? juv.
Guppya gundlachi (Pfr.)? juv.
Zonitoides arboreus (Say).
Zonitoides minusculus (Binn.).
Oxystyla floridensis Pils.

The most interesting of the lot is *Lucidella tantilla;* there is one perfect adult, three fresh shells that have been bitten in half by some rodent (?), several other fragments and three young. As I only had enough dirt to about fill a 2×3 tray you can see it was quite rich. I have noticed that *Lucidella tantilla* appears to be a favorite food with some beast that bites them fairly in half. *Gastrocopta rupicola* is frequently treated in the same way, but it is so common that it does not make so much difference.

Three miles east of Cape Sable, Simpson collected *Oxystyla floridensis* and some *Liguus* that I take to be *solidus*, although they are all very thin. They are all dead, but the yellow banding of *solidus* shows on some of them very plainly.—GEORGE H. CLAPP.

THE NAUTILUS.

Vol. XXXIV APRIL, 1921. No. 4

A NEW ACHATINELLA FROM OAHU.

BY HENRY A. PILSBRY AND C. MONTAGUE COOKE.

Achatinellæ of the typical section are very abundant in some spots on the Waianae Range. It is in fact the only place in Oahu where the collector finally has to stop picking, gorged with shells, while the bushes still hang full of them. One feels like Sindbad in the Valley of Diamonds. Snails of the section *Achatinellastrum*, however, are the greatest rarities. All that have been found up to 1920 could almost be counted on the fingers. *A. lehuiensis* Gul., and *A. lehuiensis gulickiana* P. & C., one specimen of each. *A. thaanumi* P. & C., two specimens; of *A. spaldingi* a few hundreds, but all from a very small area. The localities of these are widely scattered along the northern side of the range, just within the forest limit so far as known; each species in a single place.

Mr. W. H. Meinecke had the good fortune to find another form which we rank as a sub-species of *A. lehuiensis*, though its locality is remote from Lihue, the localities of *A. thaanumi* and *A. spaldingi* lying between them. The new subspecies, however, was taken in some abundance.

ACHATINELLA LEHUIENSIS MEINICKEI. Pl. 4, figs. 6–9.

The shell differs from *A. lehuiensis* by the wider, more capacious form. In color it is polymorphic. The pattern selected

as typical, pl. 4, fig. 9, fig. 8, left, has the last whorl closely streaked with rood's brown, cinnamon and pale pinkish buff, the former predominating, crossed by several darker, burnt umber, spiral bands and lines. A band below the suture white. This pattern fades on the penult whorl, leaving the upper part of the spire and the apex white. In some specimens the streaks are more or less diluted, pl. 4, fig. 7, to the point of disappearing, forming transitions to the following. The second main pattern, pl. 4, fig. 6, has a cartridge-buff ground, a sutural band and the spire white; streaks faint or wanting, but there are two dark bands, weakly interrupted, at periphery and on the base; sometimes a third below the subsutural white band. This is much the coloring of *A. spaldingi.*

The columellar fold is rather thin and situated high. The aperture shows the banding vividly within. Outer lip quite thin.

Fig. 9, right. Length 15, diam. 9.6, aperture 7.8 mm.; $5\frac{3}{4}$ whorls.

Fig. 9, left. Length 15.2, diam. 8.3, aperture 7.7 mm.

Fig. 8, left. Length 14.5, diam. 9.5, aperture 7.9 mm.

Waianae mountains in Haleauau valley, where the trail ascending Kaala leaves the stream. Cotypes in collections A. N. S. Phila., Bishop Museum and W. H. Meinecke.

A. spaldingi is quite distinct from the light form of *meineckei* by its texture, dull surface, etc. *A. thaanumi* stands nearer to *lehuiensis* and *meineckei*, the unstreaked pattern of the latter approaching it; yet at present *thaanumi* appears distinct by its coloration and rather solid, smooth shell.

Mr. Meinecke's account of the finding of these shells follows.

HUNTING ACHATINELLA MEINECKEI AND PARTULINA DUBIA IN THE WAIANAE MOUNTAINS, OAHU.

BY WILLIAM H. MEINECKE.[1]

On Dec. 27, 1918, I took a tramp to Mt. Kaala, Oahu, from Schofield Barracks (Leilehua). . . . On the way up, at the first

[1] Letter to H. A. P.

timber, I collected a number of specimens of *Achatinella mustelina* and accidentally found one plain *Partulina dubia*, the first I had ever collected on the north side of the Waianae Range. On Dec. 29, 1918, I returned for more, and found a few plain ones a few yards away from the trail and less than fifty yards from Haleauau stream bed. A scant hundred yards farther up the trail, under the bark and in knot holes of the smooth-leaved lehua trees growing *within arm's reach of the very trail*, I found several fine specimens of dark, banded *P. dubia*, very similar to those which I had found in Waimano Valley, above Pearl City, Koolau Range, in 1913. In spite of careful and persistent hunting, they could be found only within a very small area, less than a hundred feet in extent. They were all within fifteen feet of the ground, most of them not more than five feet off the ground.

I showed them to Mr. Irwin Spalding, who said that they were the most distinctly banded *dubia* he had ever seen; but I think that those which I collected in Waimano Valley, above Pearl City, Koolau Range, in 1913, are more distinctly banded, and in some specimens even darker. At the first opportunity, Jan. 5, 1919, I took Mr. Spalding up to the locality and we managed to find a few more specimens in a knot-hole which I had not searched quite thoroughly. Most likely you have seen those specimens in Mr. Spalding's collection while you were here last summer.

No further visits were made by me till June 13, 1920, when I went alone again and managed to find four more excellent specimens of banded *dubia*, in the same locality. A scant hundred yards above this *dubia* locality and a little farther off the trail—not more than two hundred feet away from the trail on the Haleauau side—I found under the bark on the trunks of the smooth-leaved lehua trees four young specimens of an entirely new variety or species of *Achatinella*. They were all near the ground. I hunted the tree trunks, but the higher I climbed, it seemed, the less luck I had, so I finally settled down to hunting down low. I could not hunt very long then as it was getting late.

Having collected a few *Achatinella spaldingi* (with Mr. Spald-

ing on Jan. 12, 1919) from Pukaloa, the next valley, I noticed their similarity, and thought that I had found a few *A. spaldingi.* I told Mr. Spalding later that I had found a few *A. spaldingi* in Haleauau, but he only laughed and seemed to discredit the find.

Upon my return from Kau, Hawaii, last September, I had the good fortune of meeting my old-time hiking partner and friend, Mr. Daniel B. Langford, whom I am sure you know quite well. I showed him the shells two days before he left here for Japan. On Oct. 9, 1920, I again went out, this time to look particularly for more of the new shells. I could not find any more banded *P. dubia*, but managed to get a few young specimens of the new shell [*Achatinella lehuiensis meinickei*]. As before, these were all found under the bark of the smooth-leaved lehua trees, from within a foot of the ground to about six feet. Some were on the outside, crawling. The higher up the tree I went the less I found and the smaller the specimens. At ten or twelve feet above ground I found none, so I concluded to hunt "off the ground." Here again the shells seemed to be confined to a very small area, not more than a hundred feet across, or possibly 200 ft. Late in the afternoon, there being no other place to hunt (I had hunted every plant in sight, even the Hilo grass), I concluded to try the top of a large lehua tree on which I had found several young specimens. Here I found on the leaves, *at the tip-top of the tree*, some thirty to forty feet above the ground, several large shells which I believe to be adults.

Again on Oct. 31, 1920, I went up the same trail to help the Trail and Mountain Club of Honolulu mark the trail to Kaala with signboards. I put in a good half-hour's hunt of the very same lehua tree gone over two weeks before, and was rewarded by finding over a dozen good specimens of *A. l. meineckei* and several *A. mustelina* on the very same branches, side by side. Being on a tramping trip I had to move on, so I presume that there are at least a few more specimens still to be found.

I kept the specimens alive for one week, then let them drown in water for about twenty hours, after which they were readily removed from their shells. I kept each animal and its shell

separate from the rest and put six of them (those which I could see seemed to have embryonic shells within) in separate vials and numbered the animals and their shells to correspond. The rest I preserved en masse.

Unfortunately I did not keep the animals of the banded *P. dubia*, so I cannot send you any of them. It might be well to note here that the *A. l. meineckei* seemed to be much darker, even to a purplish appearance in some cases, when alive and after drowning, but appeared very much lighter immediately after the animal was pulled, due no doubt to the color of the animal, as the shells are very thin.

NOTES ON CRASPEDOPOMA LUCIDUM, LOWE AND OTHER MADEIRA SNAILS.

BY T. D. A. COCKERELL.

In the Madeira Islands there is only one genus of Cyclostomoid shells, *Craspedopoma*. It is represented by four species, all described by Lowe, living to-day only on the main island of Madeira. One of them, *C. lucidum* Lowe, is common to the fossil beds east of Canical, Madeira, and is said to occur fossil on the Southern Desert Island and on Porto Santo. Wollaston is very explicit about the Porto Santo records, citing three localities, and remarking that the specimens are rather small. I could not find any trace of it there, and Mr. A. C. de Noronha and the Rev. Drummond Paterson, who have collected much more extensively, have also failed to find it. Near Canical, in Madeira, it occurs in the well-known beds along with *Plebecula bowditchiana* (Fér.), *Geomitra delphinula* (Lowe) and many other shells. These shells are cited by Wollaston as "subfossil", but they are properly regarded as fossils, and by all available criteria should be Pleistocene, perhaps Lower Pleistocene. Several of the forms are extinct, and the representatives of some of the living species are appreciably different from their descendants. Thus the common *Leptaxis undata* (Lowe), found in quantity fossil, mixed with *P. bowditchiana*, is larger than ordinary living specimens. It may be regarded as a distinct

race (*grandior*, n. var.), max. diam. 29–30.5 mm. In this peculiarity the fossil *L. undata* falls in line with other species, thus *P. bowditchiana* is a sort of large edition of the common living *P. punctulata* (Sby.) of Porto Santo.

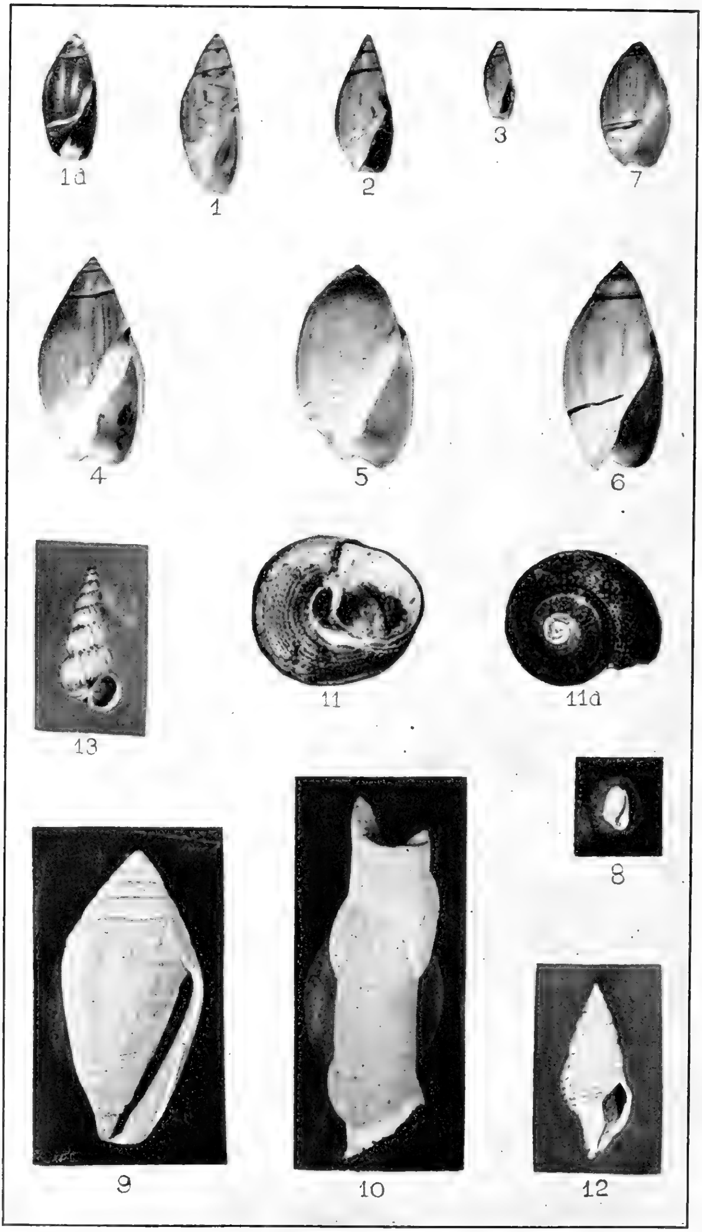
At the Mount Church, above Funchal, I found *C. lucidum* alive, and made notes on the animal. The tentacles are dark grey, with black basal collar; eyes prominent, black; head and foot pale reddish ochreous, suffused with dusky; front of head, below tentacles, with about six transverse dusky lines; an elongate dark patch on each side above mouth; a large suffused rosy area behind each eye, visible when the light shines through the animal; sole pale ochreous, not divided, but foot emarginate posteriorly. The Mount is about 1900 ft. above sea level. At higher altitudes in Madeira snails seem to be very scarce. Thus around the Pico do Serrado, at about 3000 ft., the only snail I could find was *Geomitra calva* (Lowe), though I obtained three species of slugs. These slugs were *Milax gagates*, the typical jet black form, *Arion hortensis* (new to Madeira) and *Limax maximus.* At lower altitudes the *M. gagates* are plumbeous. (var. *plumbea* Moquin-Tandon). Many years ago I described *M. gagates* var. *maderensis*, a dark brown variety from Madeira. It is now clear that it is only a color-variation, not in any sense a local race. Everything indicates that all the Madeira slugs have been introduced, though some of them have been in the island a long while. I found *Arion hortensis* also at Madeira, and on the Portella Pass another addition to the fauna, *Agriolimax laevis.*

NEW PLEISTOCENE MOLLUSKS FROM CALIFORNIA.

BY T. S. OLDROYD.

ANACHIS MINUTA, n. sp.

Shell small, thick, nuclear whorls smooth; preceding whorls four in number are cancellated by strong straight longitudinal ribs and nearly equally strong revolving ridges, three on each whorl. Whorls slightly convex, sutures broad and sunken; cancellations equally strong, on the whole length of the shell.



OLDROYD: PLEISTOCENE MOLLUSKS AND WESTERN OLIVELLAS.

Aperture small and curved, outer lip thick, with two dentations within. Length, 4; breadth, 6 mm.

Type is in the Oldroyd collection Stanford University. Type locality, upper Pleistocene at Santa Monica. Collected by Dr. Frank Clark, Santa Monica.

EPITONIUM CLARKI, n. sp. Plate V, fig. 13.

Shell white, thin, nuclear whorls missing, with 7 well-rounded post-nuclear whorls; varices 14 in number, not all continuous; making a half turn around the spire, and with a short spine near the sutures. Shell encircled by fine thread-like spiral striations not very close together; on the top of each whorl near the suture it is entirely smooth but on the base of the whorl the lines are closer together, or in pairs; the lines extend over the whole base close to the umbilicus. Aperture ovate, outer lip thickened. Length, 19; breadth, 8 mm.

Type is in the Oldroyd collection Stanford University. Type locality, upper Pleistocene at Santa Monica. Collected by Dr. Frank Clark, of Santa Monica in whose honor it is named.

TEGULA HEMPHILLI, n. sp. Plate V, figs. 11 & 11a.

Shell a fossil, thick, depressed, spire slightly conical; color, a reddish brown and mottled in appearance. Whorls four in number, with slightly angulated shoulders, encircled with a row of faint nodules. The whole shell, covered with a coarse wavy striation. Base flattened, slightly concave. Aperture oblique; umbilicus wide and deep. Height, 16; breadth, 20 mm.

Type, University of California. Type locality upper Pleistocene at Pacific Beach, San Diego, Cal. The type and four other specimens were collected by Mr. Henry Hemphill, in whose honor the species is named.

CLATHRODRILLA DIEGENSIS, n. sp. Plate V, fig. 12.

Shell elongate, spire elevated, apex acute, nucleal whorl smooth; seven postnucleal whorls. The whorls of the spire are crossed by slanting ribs, sutures deep. On the top of each whorl there is a wide revolving groove; on the base of the upper whorls there is one groove, on the next to the last whorl there are two, the body whorl shows the lines of growth and is

grooved to the end of the canal. Outer lip thin and broken, the notch shows small on the last line of growth. Aperture elliptical; columella curved, slightly encrusted. There is a slight umbilical fissure. Length, 23; breadth, 9 mm.; length of aperture including canal 9 mm.

Type, University of California, coll. Type locality, upper pleistocene, at Pacific Beach, San Diego, Co. The type and three other specimens were collected by Mr. Henry Hemphill.

Conus californicus fossilis, var. nov. Plate V, fig. 9.

This answers the description of *Conus californicus* with the exception that it is much larger, stronger, and with spire much more elevated. Length, 40; width, 19; height of spire 14 mm. angle of spire 70.

Type is in the Oldroyd collection, Stanford University. Type locality, lower San Pedro series, Nob Hill cut, San Pedro. This variety is found in both the upper and lower San Pedro beds.

Vermetus nodosus, n. sp. Plate V, fig. 10.

Shell a fragment; length, 46; breadth, 11 mm.; smooth and perfectly round and curved, septate within. The specimen has three large pear-shaped nodes, two of which are opposite each other, over the septum, one lengthwise of the shell, and the other crosswise.

Type is in the Oldroyd collection Stanford University. Type locality, lower San Pedro series of the Nob Hill cut, San Pedro.

Tornatina tumida, n. sp. Plate V. fig. 8.

Shell cylindrical, smooth, white, whorls five including the nuclear, which is small and sunken; spire rather flat, sutures deeply channeled; aperture nearly the length of the body whorl; posterior end narrowed, anterior much dilated and rounded toward the columella, which is strongly plicated, and covered with a light incrustation extending nearly to the top of the whorl. Length, 6; breadth, $3\frac{1}{2}$ mm.

Type is in the Oldroyd collection Stanford University. Type locality Lower San Pedro series of the Nob Hill cut, San Pedro, Cal.

SOME VARIETIES OF WESTERN OLIVELLAS.

BY T. S. OLDROYD.

Conrad described *Olivella pedroana* from a fossil found at San Pedro, in 1854, but the figure is more like what Carpenter described as *O. intorta;* this is plentiful in the Upper San Pedro, and not at all like *O. boetica* Cpr., described by him in the report of the British Association for Advancement of Science, published in London in 1864. The following is Carpenter's description, not a very full one, *O. boetica*, narrow, dull, thin. This has erroneously been called *anazora*, *tergina*, *petiolata* and *rufifasciata*. Habitat between San Diego and San Pedro, Santa Barbara, Monterey, Oregon, the region on each side of the Columbia River, Puget Sound and Vancouver Island. Type locality not given. Sowerby in Thesaurus Conchyliorum, Vol. 4, gives the type locality as British Columbia. They are quite plentiful at Departure Bay, Vancouver Island, but most of them are a reddish brown in color; they are also found in Puget Sound and all along the coast of British Columbia, and Alaska up in the Bering Sea. All of the northern *O. boetica* are much the same in shape but in the farther north they grow larger and more beautifully striped, a creamy white with zigzag markings of brown, these have also been found in Puget Sound, and it would be more practicable to call the northern specimens all the same. The *O. boetica* in the region between San Pedro and San Diego vary from those in the north, both in color and shape; in fact, though it is not generally known, there are two distinct varieties in this region, different in size and shape, the smaller of the two which I will describe is also found in lower California, living, and is very plentiful in the upper Pleistocene at San Pedro.

Olivella biplicata Sowerby was described in the Tankerville Catalogue in 1825. The type locality is Monterey; it is also found further south in San Luis Obispo County. Although they vary somewhat in shape of spire yet they are easily distinguished, being thicker, broader, and with a much larger callus spot than the San Pedro variety. Those found in the

Strait of Juan de Fuca and British Columbia are different, as are those found in Lower California. The West Coast Olivellas are very variable, they differ on some of the Channel Islands, and on some of the islands of the north. I have picked a type from the most prevalent forms along the cost. As far as the recent shells are concerned, we could get along without this division, but they all occur as fossils at San Pedro in various horizons and therefore I suggest these varietal names as a help and convenience in working over the fossils. There has been a color variety described by Mr. Vanatta, but I have used only the form and general outline of the shells, as the fossils have all lost their color.

Olivella boetica diegensis, n. var. Plate V, fig. 2.

This differs from the typical shells of British Columbia, in the color being a light drab, sometimes mottled; not as oval in outline, spire longer and running more sharply to a point. Length, 19; breadth, 8 mm.

Type in the Oldroyd collection, Stanford University. Range San Diego to San Pedro; living. Pleistocene in upper San Pedro.

Olivella boetica mexicana, n. var. Plate I, figs. 3.

This differs from var. *pedroana* in being smaller, more slender, spire not running quite as sharply to a point. Length, 10; breadth, 4 mm.

Type is in the Oldroyd collection, Stanford University. Type locality, Scammon's Lagoon, Lower California. Pleistocene, the upper San Pedro. Living at San Pedro. Collected by Mr. Henry Hemphill.

Olivella biplicata fucana, n. var. Plate V, fig. 4.

Shell broader across the middle and lower part of the aperture than var. *angelena;* spire running more sharply to a point from the middle of the shell. Color more uniform, being a light drab. Length, 28; breadth, 14 mm.

Type in Oldroyd collection, Stanford University. Living. Type locality, Straits of Fuca, near Cape Flattery. Pliocene at San Pedro.

Olivella biplicata parva, n. var. Plate V, fig. 7.

This var. is nearest *angelena*, but much smaller, a little broader in proportion; outer lip more curved, shell more highly colored and variable in color; found in the upper Pleistocene at San Pedro. Length, 14; breadth, 8 mm.

Type in the Oldroyd collection, Stanford University. Type locality, Point Abreojos, Lower California. Collected by Mr. Henry Hemphill.

Explanation of Plate V.

(All figures natural size.)

Fig. 1. Olivella boetica Carpenter, Alaska.
Fig. 1a. Olivella boetica Carpenter, Vancover Island, typical.
Fig. 2. Olivella boetica diegensis, n. var.
Fig. 3. Olivella boetica mexicana, n. var.
Fig. 4. Olivella biplicata fucana, n. var.
Fig. 5. Olivella biplicata typical. Monterey.
Fig. 6. Olivella biplicata angelina T. S. Oldroyd.
Fig. 7. Olivella biplicata parva, n. var.
Fig. 8. Tornatina tumida, n. sp.
Fig. 9. Conus californicus fossilis, n. var.
Fig. 10. Vermetus nodosus, n. sp.
Fig. 11. Tegula hemphilli, n. sp.
Fig. 12. Clathrodrilla diegensis, n. sp.
Fig. 13. Epitonium clarki, n. sp.

COLLECTING SHELLS ON THE EAST COAST OF FLORIDA IN THE WINTERS 1891 AND 1892.

BY OLOF O. NYLANDER.

Collections made at Jacksonville, Pablo Beach, Indian River and Lake Worth Inlet, were partly named and compared with specimens in the museums at New York City, New Haven, Conn., Boston and Cambridge, Mass., in the summers of 1892–93. A number of the species however were not named until this winter by Mr. T. Van Hyning of the Florida State Museum

and Dr. Paul Bartsch of the U. S. National Museum, and I am under many obligations for their kind assistance.

The specimens were picked up in a general way and no special effort was made to secure large series or the minute species.

As my residence is in the extreme northern part of Maine and I have only a small library on shells, I will follow Bulletin No. 37, U. S. National Museum, by William H. Dall. Although the classification is not up to date, it has a great advantage as nearly all are familiar with the names used in that work.

In December, 1891, around Jacksonville I obtained many dead specimens of *Polygyra vannostrande* Bld. and *P. jejuna* Say, and in the St. John's River *Vivipava georgiana* Lea and *Cyrena carolinensis* Lam.

In January, 1892, I made two trips to Pablo Beach on my first visit going towards Mayport. For a distance of four miles the beach was covered with the large valves of *Cardium magnum* Born; such a mass of shells I had never seen. On my second visit, a week later, there was not a *Cardium* to be found or hardly anything in the line of shells. The two trips to Pablo Beach yielded the following species:

Purpura floridana Conr. Two specimens.

Labiosa (*Raeta*) *canaliculata* Say. Three single valves.

Tellina alternata Say. Five perfect specimens.

Dosinia discus Rev. Four fine specimens.

Petricola pholadiformis Lam. One single valve.

Pholas costata Linne. Single valves common.

Pinna seminuda Lam. Common.

Pinna muricata Linne. Common.

Donox variabilis Say. The sand at low water mark was filled with these shells.

Arca incongrua Say. Few fine specimens.

Arca ponderosa Say. Two living specimens.

Cardium robustum Sol. Common.

In the month of February I started on a four weeks trip from Jacksonville to Titusville by rail, and then by steamer the whole length of Indian River to Jupiter and Lake Worth. While examining the limestone outcrops at Rock Ledge on Indian

River, I picked up two specimens of *Mytilopsis leucopheata* Conr. and one *Planorbis duryi* Wetherby. In many places oyster beds are common, and in the Indian River narrows the mangrove roots between high and low water mark were completely covered with young oysters.

Three weeks in March, 1892, was spent at Lake Worth, the most beautiful place on the Florida coast, with the Gulf stream close to the shore. Much of my time was spent in looking at the living forms of everything found below low water in the inlet, and a collection of many objects was made. I had no special collecting outfit, so the small and minute forms were practically left out. The inlet of Lake Worth was at that time a lonely place, only occasionally a sail boat passed in and out, and at low tide I could wade across. At the time of my visit to Lake Worth two residents at Palm Beach had small collections, Mrs. Nelsson and her children collected after storms and had some shells that I did not see and claimed they were the only specimens found by any collector at Palm Beach proper.

Mr. J. J. White at the time a resident of Palm Beach had a small collection of named shells collected mostly at Lake Worth. Mr. White published two articles in THE NAUTILUS, Vol. XI, page 31 and Vol. XII, page 142, about the specimens collected by him and his description of the locality is good.

Shells collected at Lake Worth inlet:

Ostrea virginica Gmel. Young specimens common.

Ostrea frons Linne. Single valves.

Ostrea cristata Born. Single valves.

Anomia simplex Orb. Common on old logs.

Spondylus spathuliferus Sowb. A few single valves.

Pecten irradians var. *dislocatus* Say. Single valves common.

Pecten ornatus Lam. Single valves common.

Pecten nodosus Linn. Several single valves.

Pecten fuscopurpureus Conr. Single valves common.

Avicula atlantica Lam. One fine specimen.

Margaritiphora radiata Lam. One fine specimen.

Pinna muricata Linn. Common.

Pinna seminuda Lam. Common.

Modiolus demissus Dillw. Several.

Modiolus tulipus Linn.
Arca occidentalis Phil. Several fine living specimens.
Arca transversa Say. One fine specimen.
Arca secticostata Rve. One single valve.
Arca campechensis Dillw. Six fine specimens.
Pectunculus pennaceus Gmel. Four single valves.
Divaricella dentata Wood. One fine pair.
Lucina tigrina Linn. Several fine specimens.
Chama macrophylla Lam. One specimen and single valves.
Cardium isocardia Linn. Several fine specimens.
Cardium muricatum Linn. Single valves.
Liocardium serratum Linn. One fine valve.
Liocardium mortoni Conr. Common.
Venus mortoni Conr. One single valve.
Chione cancellata Linn. Common.
Chione intapurpurea Conr. One fine single valve.
Anomalocardia cuneimeris Conr. Several.
Pitaria simpsoni Dall. One single valve.
Pitaria fluminata Menke. One fine specimen.
Tagelus gibbus Spengler. One good specimen.
Tellina magna Spengler. One large single valve.
Tellina brasiliana Lam. Several fine specimens.
Macoma cerina C. B. Adams. Common.
Teredo navalis Linn. Common in timbers.
Bulla occidentalis A. Adams. In Lake Worth common.
Haminea guildingi Swainson. In Lake Worth common.
Melampus lineatus Say. In Lake Worth common.
Siphonaria naufragum Stearns. Lake Worth inlet few.
Terebra dislocata Say. Common.
Conus proteus Hwass. One partly broken specimen.
Cancellaria reticulata Linn. Few.
Oliva literata Lam. Several large specimens.
Marginella apicina Menke. Common in Lake Worth.
Fasciolaria gigantea Kiener. Two young shells.
Fasciolaria distans Lam. Beach-worn shells.
Fulgur pyrum Dillw. Three specimens.
Fulgur canaliculata Say. Beach-worn shells.
Fulgur perversa Linn. One large living shell 11 inches long.

Fulgur carica Linn. Large dead shells, common north of inlet.

Melongena corona Gmel. Old shells in Indian camp sites in Lake Worth.

Tritonidea tincta Conr. Few shells.

Nassa vibex Say. Common.

Columbella mercatoria Linn. Six specimens.

Murex pomum Gmel. One large dead shell.

Murex rufus Lam. One shell found at Palm Beach.

Murex ? A large much worn shell.

Eupleura caudata Say. One specimen, Lake Worth.

Muricidea floridana Conr. Common on old logs in inlet.

Purpura deltoidea Lam. Three specimens.

Janthina fragilis Lam. Several living specimens on beach.

Tritonium chlorostoma Lam. Five dead specimens.

Tritonium pileare Lam. Seven good specimens.

Tritonium olearium Linne. One good specimen.

Tritonium femorale Linne. One good specimen.

Cassis cameo Stimpson. Two badly worn shells on beach.

Cassis tuberosa Linn. One good specimen at old inlet.

Cassis testiculus Linn. Two good specimens.

Cassis inflata Shaw. Fine specimen, common.

Dolium galea Lin. One large fine specimen and several small ones.

Pyrula papyratia Say. Three specimens.

Cypræa exanthema Linn. Ten specimens, two very large.

Cypræa cervus Linn. One good specimen.

Cypræa spurca Linn. Several good specimens.

Trivia pediculus Linn. Common.

Strombus gigas Linn. Common.

Strombus pugilis Linn. Two specimens on beach.

Strombus bituberculatus Lam. In Lake Worth, common.

Strombus costatus Gmel. One good specimen.

Cerithium caudatum Sow. Two specimens.

Cerithium semiferruginum Lam. Two specimens.

Cerithium floridanum Morch. Common in Lake Worth.

Cerithium algicola C. B. Adams. Few.

Cerithium literatum Born. Few.

Cerithium muscarum Say. Few.
Modulus floridanus Conr. Common.
Litorina lineata Phil. Common.
Ampullaria depressa Say. Shells inhabited by crabs.
Crepidula fornicata Say. Worn specimens.
Crepidula plana Say. Small specimen in dead shells.
Natica canrena Lam. Two dead shells.
Nerita duplicata Say. Several good specimens.
Sigaretus perspectivus Say. One good specimen.
Turbo crenulatus Gmel. Living on dead logs in inlet.
Astraea tuber Linn. Many fine large specimens were collected.
Livona pica Linn. One large dead shell.
Calliostoma jujubinum Gmel. One good specimen.
Nerita peloronta Linn. One large shell.
Nerita versicolor Lam. One good specimen.
Neritina virginea Linn. Common in Lake Worth.
Ceratozona rugosa Sow. On lime rock in inlet.
Argonauta argo var. *americana* Dall. One specimen.
Spirula peroni Lam. Common on beach.

Of the land shells at Lake Worth, *Euglandina rosea* Fer. and *Polygyra septemvolva* Say seemed common.

MOLLUSCAN SPECIES NAMED IN THE PORTLAND CATALOGUE, 1786, PART II, FOREIGN SPECIES.

BY WILLIAM HEALEY DALL.

(Concluded from p. 100.)

ANOMIA SANGUINEA S., p. 184, No. 3928. Scarlet Anomia from New Zealand. +*Terebratula sanguinea* Leach, 1815.

ARCA LABIATA S., p. 185, No. 3947. Davila, 1, pl. 18. +*Arca concamera* Bruguière, 1789; and +*Cucullaea auriculifera* Lamarck, 1819.

ARCA NODULOSA S., p. 98, No. 2158; p. 100, No. 2194. China. Gualtieri, pl. 87, E. Not of O. F. Müller, 1776.

ARGONAUTA HIANS S., p. 44, No. 1055 *b;* p. 174, No. 3798. China. Brown paper Nautilus. Rumphius Thes. 18, B. +*A. hians* Dillwyn, 1817.

ARGONAUTA NAVICULUS H., p. 44, No. 1055 *a*. Rumphius, Thes. 18, 4. +*A. nitida* Lamarck, 1822.

ARGONAUTA NODOSA S., p. 96, No. 2120; p. 173, No. 3734. Tuberculated paper Nautilus. Cape of Good Hope. Rumphius, Thes. 18, 1. +*Argonauta tuberculata* Shaw, 1811.

BUCCINUM GALEA S., not Lin., p. 61, No. 1399 *a*. The great Oriental tun shell. ?+*Dolium melanostoma* Jay, 1839.

BUCCINUM IRIS S., p. 14, No. 301; p. 64, No. 1455; p. 153, No. 3356. Martyn, 1, f. 2 *b*. =*Buccinum prismaticum* Martyn, 1784.

BUCCINUM CALCARATUM S., p. 133, No. 2961. Gualtieri, 31, F. =*Murex hippocastaneum* Born, 1780.

BUCCINUM CEPA S., p. 61, No. 1399 *b*. The great Mediterranean tun shell. =*Dolium galea* (Linné), 1758.

BUCCINUM CORONARIUM S., p. 160, No. 3495. New Zealand. The great waved lip Buccinum. Martyn II, f. (45). =*Buccinum succinctum* Martyn, 1784.

BUCCINUM DUBIUM H., p. 188, No. 2998. Smooth terrestrial shell of a pale brown color, with several rows of brown spots on each volution. ?=*Ampulla priamus* Bolten, 1798.

BUCCINUM MURICATUM H., p. 104, No. 2296. Favanne III, x 3. +*Colubraria obscura* (Reeve), 1844.

BUCCINUM NEREIDEUM S., p. 33, No. 776. Mediterranean Trumpet Shell. +*Triton nodiferus* Lamarck, 1819.

BUCCINUM PANDURA S., p. 17, No. 371; p. 103, No. 2262. The pink Harp from Guinea. +*Harpa rosea* Lamarck, 1822.

BUCCINUM PUSTULOSUM S., p. 88, No. 1960. Rumphius, Thes. 49, B. +*Ranella argus* Gmelin, 1791–2.

BUCCINUM TAURINUM S., p. 142, No. 3158. China. Lister, 841, 69. =*Terebra subulata* Linné, var. (1767).

BUCCINUM TRITONIS H., p. 29, No. 68; p. 32, No. 765. Oriental Trumpet Shell. =*Murex tritonis* Lin. (ex parte), 1758.

BUCCINUM TRITONIS S., p. 29, No. 68; p. 33, No. 776; p. 35, No. 839. Mediterranean Trumpet Shell. +*Triton nodiferus* Lam. (=*Buccinum nereideum* Solander, No. 776).

BULLA IMPERIALIS H., p. 155, No. 3391. Pink-mouthed poached egg, from the Friendly Islands. =*Ovula tortilis* Martyn, 1784.

BULLA ZONATA S., p. 164, No. 3561; p. 172, No. 3758. Born, f. 1, tab. 9, 1780. China. =*Bulla amplustre* Born, not Lin. +*B. velum* Gmelin, 1791–2.

CARDIUM HYSTRIX S., p. 116, No. 2550. Gualtieri, 72, B. ?+*Cardium indicum* Lamarck, 1819.

CARDIUM IMPRESSUM S., p. 155, No. 3389; China, p. 188, No. 3996; Tranquebar. Born, t. 2, f. 15, 16. Pink spotted variety of the Venus heart cockle. =*Cardium cardissa* Born, not Lin. +*C. roseum* Gmelin, 1791–2. +*C. junoniae* Lam., 1819.

CARDIUM PROTRUSUM S., p. 178, No. 3825. China. Lister, 319, 156. +*C. humanum* Wood, Ind. Test. 1818, not of Linné, 1758.

CARDIUM SPINOSUM S., p. 105, No. 2297. Mediterranean. Favenne 52, A 2. =*C. echinatum* Linné, 1758.

CONUS ARANEOSUS S., p. 76, No. 1714; p. 106, No. 2328. Spiderweb cone from China and Coromandel. Martini. Conch. Cab., Vol. II, fig. 676. +*C. araneosus* Hwass, 1792.

CONUS ARCHITALASSUS S., p. 189, No. 4017. Amboyna. Argenville, Suppl. tab. 1, figs. M, N; Martini, Conch. Cab. II, vign. No. 26, figs. 1, 2, p. 214. +*C. ammiralis* var. *granulatus* Lam., 1822; not *C. granulatus* Gmelin, 1791–2.

CONUS AUGUR S., p. 44, No. 1046. Knorr, VI, tab. 13, fig. 6. +*C. magus* Born, 1780, not of Linné. +*C. augur* Bruguière.

CONUS FUSCATUS S., p. 160, No. 3491. China. Martini, Conch. Cab. II, f. 693. =*C. fuscatus* Born, 1780.

CONUS MAPPA S., p. 116, No. 2554. "China." Knorr, 1, tab. 8, f. 4. =*Conas cedonulli* L. var. *mappa* Hwass, 1792.

CONUS NOCTURNUS S., p. 156, No. 3411. China. Martini, Conch. Cab. II, f. 687, 688. +*C. nocturnus* Hwass, 1792.

CONUS PULCHER H., p. 179, No. 3844. Coast of Guinea. Lister, 772. Not *C. pulcher* A. Adams, 1853. ? *C. proteus* Hwass.

CONUS QUERCINUS S., p. 67, No. 1501. Martini, Conch. Cab. II, f. 657. =*C. cingulum* Martyn, 1784. +*C. quercinus* Hwass, 1792.

CONUS UNDULATUS S., p. 180, No. 3866. Gualtieri, 25, 1 (f. A A). =*Conus textile* Linné, 1758.

CHAMA LAZARUS var. PANNOSUS S., p. 96, No. 2123. Rumphius, Thes. 48, 3. =*C. lazarus* Linné, 1767, +*damaecornis* Lamarck, 1819.

CLIO S., p. 115, No. 2520; not of Linné. Davila 1, pl. 20, figs. D, E, e. Represents three forms of *Cavolina*.

CYPRAEA AURORA S., p. 10, No. 197; Otaheiti; p. 178, No. 3831. Orange Cowry, from the Friendly Islands. =*C. aurantia* Martyn, No. 59, 1784.

CYPRAEA PANTHERINA S., p. 50, No. 1206. Lister, 681, 28. +*Cypraea guttata* Lamarck, 1810. +*C. tigrina* Lam., not Gmelin.

CYPRAEA PUSTULATA S., p. 106, No. 2330. Orange warted cowry from China. Lister, 710, 62. +*C. pustulata* Lamarck, 1810.

HELIX ALBA H., p. 186, No. 3970, not of Gmelin. A terrestrial sinistral shell from the E. Indies. Lister, t. 33, 32 and 46. Favanne, 63 E. =*Amphidromus* sp. indet. (? *citrinus* auct.)

HELIX ERUBESCENS H., p. 187, No. 3973. Lister, 24, 22. =*H. pudica* Müller, 1774.

HELIX OTIS S., p. 38, No. 925. Favanne, t. 63, f. 11. +*Labyrinthus otis* Beck, 1838.

HELIX PLICATA S., p. 18, No. 400. Favanne, pl. 61, f. D. 10; not *plicata* Born, 1780. ?=*Ampullaria* sp., or *Natica*.

HELIX VITELLUS H., p. 26, No. 601. Rumphius, Thes. 22, 1. =*Natica vitellus* Linné, 1758.

ISOGNOMA LIGNEA S., p. 9, No. 176. =*Ostrea isognomum* Linné, 1758.

ISOGNOMA RIGIDA S., p. 115, No. 2516. Pulu Condore. Lister, 227, 62. =*Pedalion* Solander, 1770.

ISOGNOMA PERNA S., p. 137, Mo. 3041. China. =*Ostrea perna* L., 1767.

LEPAS CORNUCOPIAE S., p. 101, No. 2216. Argenville, 26, D. +*Anatifer pollicipes* Bruguière, 1789.

HELIX INSIGNITA H., p. 176, No. 3794. Lister, 67, 68. *Helix marginella* Gmel.

MACTRA NIVEA H., p. 29, No. 678. Great white Mactra from the coast of Guinea. ? Le Fatan of Adanson.

MUREX ELONGATUS S., p. 65, No. 1479. Favanne, pl. 79, f. H. +*M. clavus* Kiener, 1841.

MUREX FIMBRIATUS S., p. 106, No. 2327; p. 136, No. 3038. Martyn, 1, f. 6 c, Favanne, 37, H. 1; Davila, 1, pl. 10. =*Trophon geversianus* Pallas, 1769.

MUREX RETICULARIS H., p. 12, No. 240, Sicily. Born, 11, 5, 1780. =*Murex reticularis* Linné, 1758.

MYA GIGAS S., p. 101, No. No. 2213. Mediterranean. Lister, 414, 258. =*Panope glycymeris* Born, 1778 (as *Mya*).

MYA OVALIS S., p. 134, No. 2983. Lister, 146, 1; not of Pulteney, 1799, or Donovan, 1801. +*Unio batavus* Maton and Rackett, 1807.

MYTILUS CASTANEUS S., p. 69, No. 1560. Lister, Conch., 154, 9, Vir[ginia]. =*Unio complanatus* Sol.

MYTILUS LINGUA S., p. 77, No. 1718. Amboyna. Humphrey's Conch., pl. 2, f. 2, 1770; Petiver, Gazoph. 32, 9. =*Patella unguis* L., 1758. =*Lingula unguis* Lam., 1799.

MYTILUS PICTUS S., p. 158, No. 3458. Painted muscle, bright green, waved with brown, from the Mediterranean. Knorr, IV, t. 15, f. 5. =*M. ungulatus* Linné, 1758.

MYTILUS UNGUIS S., p. 172, No. 3717. Amboyna. Humphrey's Conch., pl. 2, f. 2, 1770; Petiver, Gazoph. 32, 9. =*Patella unguis* L., 1758.

NAUTILUS SCROBICULATUS S., p. 182, No. 3906. Great umbilicated Nautilus from New Guinea. Lister, 552, 4; Knorr, IV, t. 22, f. 1.

OSTREA PURPUREA S., p. 189, No. 3091, New Holland; p. 174, No. 3741. China; p. 177, No. 3878. =*O. cucullata* Born, 1780.

PATELLA AURICULARIA H., p. 154, No. 3384; p. 187, No. 3983. Amboyna. China. Rumphius, Thes. 40, N (as an operculum). +*Dolabella rumphii* Cuvier, 1817.

PATELLA FUNGOIDES H., p. 55, No. 1301. Mushroom limpet from Cape of Good Hope. Humphrey's Conch., pl. IV, f. 16, 1770. +*Patella fungoides* Bolten, 1798.

PATELLA GORGONICA H., p. 105, No. 2302. Humphrey's Conch., III, f. 8, 1770.

PATELLA MACROSCHISMA H., p. 71, No. 1601. Humphrey's Conch., pl. 7, f. 3, 3, 1770.

PATELLA MYTILIFORMIS S., p. 42, No. 990; p. 58, No. 1359. Falkland Islands. Humphrey's Conch., III, f. 9, 1770. =*Patella mytilina* Helbling, 1779. +*P. gondola* Bolten, 1798.

PATELLA OCULUS-HIRCI H., p. 105, No. 2302. Humphrey's Conch., pl. 2, f. 6, 1770. =*Patella oculus* Born, 1778.

PATELLA PULCHRA H., p. 105, No. 2302 *b;* p. 135, 2995. Cape of Good Hope. Humphrey's Conch., t. 2, f. 8, 1770.

PATELLA UMBRACULUM H., p. 178, No. 3830. Umbrella limpet from China. Humphrey's Conch., pl. 5, f. 5, 1770. +*Patella umbella* Gmelin, 1791–2.

PINNA RIGIDA S., p. 136, No. 3040; p. 138, No. 3078. Knorr, II, t. 26, f. 1. +*Pinna rigida* Dillwyn, 1817.

PLACUNA PLACENTA S., p. 8, No. 136; p. 16, No. 353 a. China; p. 140, No. 3119. Chinese window shell. =*Anomia placenta* Linné, 1758.

PLACUNA EPHIPPIUM S., p. 16, No. 353 b. Polish saddle shell. =*Anomia ephippium* Linné, 1758.

SERPULA ATTRAHENS S., p. 106, No. 2331, Madagascar. Humphrey's Conch., pl. VII, f. 15, 1770.

SERPULA GIGANTEA H., p. 6, No. 97; Oriental. Seba III, pl. 94, largest fig. p. 186, No. 3955, Luconia, 21 inches long. =*Serpula gigantea* Pallas, 1766.

SERPULA TORTUOSA H., p. 184, No. 3939. Humphrey's Conch., pl. 11, f. 4, 1770.

SOLEN PALLIDUS S., p. 42, No, 1005 *a*. Lister, t. 412, lower figure. Solen sp. indet.

SOLEN ROSTRATUS S., p. 160, No. 3487, China; p. 167, No. 3624. A large fine violet Solen from China. Valentyn, Biv. 13, No. 5. +*Sanguinolaria diphos* Gmelin, 1791–2.

STROMBUS AMPLUS H., p. 28, No. 658. Brander, Foss. Hant. pl. 6, f. 76, 1766. =*Hippochrenes amplus* (S.).

STROMBUS AURIS DIANAE H., p. 29, No. 679; p. 64, No. 1452. Pulu Condore, Martyn, 1, f. 1. =*Alata aratrum* Martyn, 1784.

STROMBUS LUCTATOR H., p. 87, No. 1926; Brander, Foss. Hant. pl. 5, f. 64.

STROMBUS SINUATUS H., p. 189, No. 4022. Seba III, 62, 3; Favanne, 22, A. 2. +*Strombus laciniatus* Dillwyn, 2817.

STROMBUS TRICORNIS H., p. 5, No. 50. Martini, Conch. Cab. III, f. 843, 845. Lister, No. 873, f. 29. +*Strombus tricornis* Lamarck, 1822.

STROMBUS TRUNCATUS H., p. 133, No. 2967; p. 150, No. 3507; p. 169, No. 3655. E. Indies. Davila 1, t. 12, f. 14. +*Pterocera bryonia* Gmelin, 1791–2.

TELLINA CRUENTA S., p. 10, No. 187. Knorr, VI, t. 12, f. 1. +*Sanguinolaria sanguinolenta* Gmelin, 1792.

TROCHUS GRANOSUS H., p. 87, No. 1942. New Zealand. Martyn, f. 37, 1784. =*Trochus granosus* Martyn, 1784.

TROCHUS ONUSTUS H., p. 4, No. 31. +*Xenophora conchyliophora* Born, 1780.

TROCHUS SOLARIS S., p. 86, No. 1914, New Zealand. Martyn, 1, f. 30, g. =*Trochus heliotropium* Martyn, 1784.

TROCHUS SULCATUS H., p. 113, No. 2481. New Zealand. Der Naturforscher IX, t. III, f. 5, 6. Martyn, f. 33 (=35) r. (*Trochus sulcatus*): +*T. cookii* Gmelin, 1792. (Schreibers, 1788.)

TROCHUS TECTUS H., p. 187, No. 3982. All Saints Id., West Indies. Lister, 628, 14 (bad). ?+*T. americanus* Gmelin, Jamaica.

TURBO CORNUTUS S., p. 147, No. 3235, China. Davila 1, pl. 5, f. I. +*T. cornutus* Gmelin, 1791–2.

TURBO SMARAGDUS H., p. 11, No. 229. New Zealand. =*Limax smaragdus* Martyn, f. 73, 1783.

TURBO UNDULATUS H., p. 18, No. 408; p. 178, No. 3828. New Holland. =*Limax undulatus* Martyn, f. 29, 1784.

VENUS ARCTICA S., p. 138, No. 3074. Lister, 426, 267. =*Saxicava arctica* Linné, 1767.

VENUS EROSA S., p. 71, No. 1603; p. 186, No. 3961. New South Wales. Chemn. VI, 336. +*Cyrena zeylanica* Lamarck, 1818. +*Venus coaxans* Gmelin, 1791–2.

VENUS PUNCTATA S., p. 98, No. 2150. Amboyna. Rumphius, Thes. 43 G. +*Cytherea meretrix* Lamarck, 1818.

VOLUTA AMPHORA S., p. 30, No. 708; p. 181, No. 3874. Martini, Conch. Cab. III, 780, Africa. +*V.* (*Cymbium*) *diadema* Lamarck, 1811.

VOLUTA ANGURIA S., p. 64, No. 1448. Great brown African melon. Martini, Conch. Cab. III, 767. + *V. neptuni* Gmelin, 1791–2.

VOLUTA ARAUSIACA S., p. 26, No. 611; p. 186, No. 3965. Amboyna. Rumphius, Thes. 37, 2. + *Voluta vexillum* Gmelin, 1791–2.

VOLUTA CITHARA S., p. 96, No. 2122; p. 182, No. 3902; p. 190, No. 4030. Seba III, pl. 65, f. 1, 2. + *V. armata* Lamarck, 1811.

VOLUTA ELONGATA S., p. 30, No. 707; p. 143, No. 3161. Martyn, t. 1, f. 25, New Caledonia. =*Limax fibratus* Martyn, 1784. (*Placostylus f.*)

VOLUTA FILOSA S., p. 76, No. 1705. Martyn, f. 22, 1. =*Mitra nexilis* Martyn, 1783.

VOLUTA GRAVIS S., p. 103, No. 2274. Malacca Str. Martini, Conch. Cab. III, 95, f. 916, 917. + *Turbinella rapa* Lamarck, 1822.

VOLUTA HAUSTRUM S., p. 137, No. 3054. China. Martini, Conch. Cab. III, 781. + *Voluta (Cymbium) tessellata* Lamarck, 1811.

VOLUTA IMPERIALIS S., p. 183, No. 3913. Luconia. Martini, Conch. Cab. III, f. 934–5. + *Voluta imperialis* Lamarck, 1811.

VOLUTA INCOMPTA S., p. 96, No. 2116. South Seas. Martyn, f. 19, 1. =*Mitra tessellata* Martyn, 1784.

VOLUTA INCRASSATA S., p. 13, No. 264; p. 131, No. 3696; p. 105, No. 2315. Martini, Conch. Cab. III, f. 499, 500. + *Oliva angulata* Lamarck, 1811.

VOLUTA MELO S., p. 41, No. 969. Martini, Conch. Cab. III, f. 772, 773. + *Voluta indica* Gmelin, 1791–2.

VOLUTA NOBILIS S., p. 6, No. 89; p. 172, No. 3711; p. 183, No. 3926. East Indies. China. Martini III, f. 774–6; Lister, 769, 6. + *Voluta scapha* Gmelin, 1791–2.

VOLUTA PEPO S., p. 87, No. 1940; p. 100, No. 2204. Martini, Conch. Cab. III, f. 768–70. Great brown melon from Guinea. + *Voluta navicula* Gmelin, 1791–2. + *V. neptuni* Gmelin, ex parte, fide Pfr.

VOLUTA PONDEROSA S., p. 25, No. 566; p. 189, No. 4023. East

Indies (reversed shell, a dextral one figured by Favanne, pl. 35, f. 1). Martini, Conch. Cab. III, f. 916. +*Turbinella rapa* Lamarck, 1822.

VOLUTA SCABRIUSCULA H., p. 85, No. 1913. Martyn, f. 21. =*Mitra sphaerulata* Martyn, 1784.

VOLUTA SCAFA S., p. 41, No. 969 *a;* p. 136, No. 3039. Guinea. Adanson, t. 3, f. 2. Martini, Conch. Cab. III, t. 70, f. 764. +*Voluta porcina* Lamarck, 1811.

VOLUTA VIRESCENS S., p. 26, No. 610; p. 136, No. 3020; p. 174, No. 3751. Guinea. Martini, Conch. Cab. III, f. 932, 933. +*Voluta polyzonalis* Lamarck, 1811.

TWO NEW SOUTH AMERICAN SHELLS.

BY W. H. DALL.

A bunch of Gorgonians was recently received from the Paulista Museum, San Paulo, Brazil, which were growing on bivalve shells. The latter were separated valves often in good condition. The locality is San Sebastian Island off the southern coast of Brazil.

Among them was a *Macoma*-like shell which appeared to be new.

The subgenus *Scissula* includes species like *T. decora* Say, which have the hinge of *Angulus* and an external oblique sculpture of incised lines. The present shell however has two deeply bifid teeth in the right and one in the left valve with no trace of a lateral lamina in either valve. It therefore bears the same relation to *Macoma*, subgenus *Psammacoma* as *Scissula* does to *Angulus* in the *Tellina* group. I propose therefore to institute a new section for it.

PSAMMACOMA (TEMNOCONCHA) BRASILIANA n. sp.

Shell white, equivalve, subequilateral, thin, compressed, dorsal slopes subequal; anterior end broadly rounded, posterior end obscurely obliquely truncate but hardly angulate at the junction with the broadly arcuate base; sculpture of incremental lines upon which are impressed sharp regular grooves about

three to a millimeter, at first concentric but about the anterior third of the valve becoming oblique, and becoming obsolete near the posterior third; beaks inconspicuous; interior chalky white, the muscular impressions subequal, the pallial sinus rounded, in front, mostly free from the pallial line and falling a little short of the anterior adductor scar; the ligament is short and the margins smooth. Length 35; height 23; diameter 8; the vertical from the beaks behind the anterior end 17 mm. U. S. Nat. Mus. Cat. No. 333023.

AMPULLARIA (FELIPPONEA) ELONGATA n. sp.

Shell solid, conic, of three and a half flattish whorls separated by a distinct, almost channelled suture (the apex deeply eroded); shell substance grayish to slate color, with irregular broad spiral purple lines, the whole covered with an olivaceous, thick, polished, dehiscent periostracum of a brittle character; base rounded, umbilicus only a narrow chink behind the thin raised inner lip; aperture pear-shaped, smooth inside, showing the color bands; margin sharp-edged, not continuous across the body. Height of decollate shell 29; of last whorl 25; of aperture 17; of maximum diameter 19 mm. U. S. Nat. Mus. No. 333024.

Habitat. Uruguay River, Dept. of Paysandú; Dr. F. Felippone.

It is interesting to get another and quite distinct species of this subgenus which seems characteristic of Uruguay River fauna. The present species differs most obviously from the type, *F. neritiniformis*, in the flat-sided spire and absence of an umbilicus.

THE GENUS PLEBECULA LOWE.

BY T. D. A. COCKERELL.

At the fossil-beds near Caniçal, Madeira, the large globular shells of *Plebecula bowditchiana* (Fér.) occur in hundreds of thousands weathered out of the fine sand. In Porto Santo we find similar deposits, but nearly all the species are different, in

spite of the fact that the mountains of the smaller island are plainly visible from the vicinity of Caniçal. Between Porto Santo and Madeira is deep sea, and it is evident that the islands could not have been united within the life-time of existing species of snails. Nevertheless, among the scant half-dozen forms common to the Caniçal and Porto Santo deposits is *P. bowditchiana*, one which would seem among the least likely to be accidentally transported across the sea. It is a heavy white shell, resembling in a general way the well-known *Leucochroa candidissima* of the Mediterranean basin. The vast quantities at Caniçal suggest at first a former climate very different from that of today, but the snail was doubtless adapted to arid or semiarid conditions, such as prevail now at the eastern end of Madeira. The sandy wastes of the locality swarm with living snails at the present time, but they are with inconspicuous exceptions *Helix pisana*, probably introduced long ago from Africa by the Moors. The *P. bowditchiana*, however, would need more cover than exists now, as they were nocturnal, hiding by day, if we may judge by the habits of their living relatives. I have carefully compared the Madeira and Porto Santo *P. bowditchiana*, thinking that some differences might be found, but they are unquestionably identical. There is, however, this difference; the Porto Santo specimens show a much wider range of variation. This may be taken to indicate that the species evolved on Porto Santo, and the one or more examples which somehow reached Madeira started a colony which remained essentially true to the type represented by the immigrants. Twenty *P. bowditchiana* from Porto Santo varied as follows in dimensions, the first figure of each pair being the length, the second the diameter at right angles to the axis, both in mm. 15.18 (1), 15.20 (1), 16.20 (2), 17.19 (1), 18.21 (2), 20.22 (1), 21.22 (2), 21.23 (1), 22.22 (1), 22.24 (2), 23.23 (3), 24.27 (1), 25.24 (1), 25.25 (1). The shell having a length less than 18 mm. (obtained in the vicinity of the Fonte d'Areia) constitute a distinct form or variety, which may be named *reducta*. They are not only small, but differing from the related small *P. punctulata*, they are broadened, with a strongly and evenly arched outer lip, so that the whole shape is very like that of

Helix hortensis. The one I take as typical of the variety measures 16 by 20 mm., and the apex, with curved rows of granules, is delicately tinted with orange, giving the shell a more recent appearance than usual. This may be the latest phase of *bowditchiana,* but its resemblance in form to more ordinary snails might be taken to indicate greater antiquity. I was not able to make out distinct zones in the Porto Santo fossil beds, although some species abound in one place, and are rare or absent elsewhere. The sandy deposits are broken down by the weather, and the shells loosened upon the surface. Many of these are again covered, as the wind blows the sand, and the lime again cements the deposit, so that it is quite possible to find shells of entirely different ages mixed together. In fact the very modern *H. pisana* is being thus incorporated, and no doubt in years to come it will be possible to dig *pisana* and *bowditchiana* out of the same fossil-beds, just as if they had been strictly contemporaneous.

In order to show the greater uniformity in the Caniçal P. *bowditchiana,* I give the measurements of 156 shells, citing the two dimensions as before. 18.19 (1), 18.21 (1), 19.20 (2), 19.21 (7), 20.20 (6), 20.21 (18), 20.22 (8), 21.21 (9), 21.22 (22), 21.23 (7), 21.24 (3), 22.21 (1), 22.22 (12), 22.23 (28), 22.24 (2), 23.22 (1), 23.23 (5), 23.24 (13), 23.25 (1), 24.22 (1), 24.24 (2), 24.25 (4), 26.25 (1).

The nearest living relative of *P. bowditchiana* is *P. punctulata* (Sowerby), exceedingly common on Porto Santo, and found also on the outlying islets, even the isolated Ilheo de Nordeste. It hides under rocks, more or less buried in the ground, and I never saw it crawling abroad. A remarkable feature is the opaque white mantle, which, when the animal is within the shell, looks at first sight like a dense white epiphragm. The genitalia show a very long slender flagellum. The living animal may be described as follows : Animal whitish translucent; tentacles and neck above dark grey, nearly black; foot very broad, caudal end very broad and flat; a large black mark on each side posterior to tentacles; mantle opaque white (specimen from Villa Baleira). The shells vary much in color, some being very dark. Two bands, never seen in *bowditchiana,* are

nearly always present, but on the Ilheo de Baixo, on Jan. 22, I found a creamy-white bandless variety, which may be called var. *lactescens*. This form was also known to Wollaston. The distribution of *H. punctulata* is peculiar. It has not been recorded from Madeira, but a rather small and peculiar race (*avellana Lowe*) occurs both living and fossil on Bugio, the southernmost of the Desertas. At the fossil-beds near Caniçal, Madeira, however, I found a specimen of undoubted *P. punctulata*, measuring 13 by 14 mm., thinner than *bowditchiana*, and still showing faint traces of the bands. It has a recent appearance, and may not be truly fossil. Whether *P. punctulata* really lived in Madeira, may still remain somewhat uncertain, as Baring and Ogilvie Grant (Zoologist, Nov. 1895) report finding seven whole *H. pisana* in the stomach of a kestrel, and it is conceivable that an owl pellet might contain an unbroken snail shell.

The *P. punctulata* in Porto Santo suffer severely from an enemy, the broken shells being found very commonly under rocks. From the position of these remains, it was impossible that the enemy should be a bird, and the small lizards (*Lacerta dugesii*) so common under the rocks probably could not break the shells. Baring and Ogilvie Grant (loc. cit.) speak of the great spider of Porto Santo (*Lycosa madeirana* Walck.) as feeding on snails, and I have no doubt that this is the mysterious enemy of *P. punctulata*. In the face of such an enemy, *P. bowditchiana*, with its large and thick shell, would have a great advantage over its smaller relative.

The common *P. vulgata* (Lowe) of Madeira has the same white mantle, and is evidently strictly congeneric. According to Pilsbry this is the real *nitidiuscula* of Sowerby, though not that of Wollaston. The soft parts of *vulgata* from Funchal were described as follows :

Animal with foot broad, white ; tentacles black ; dorsal side of head and neck very dark, abruptly contrasting with the white foot ; mantle opaque white. The habits of *vulgata* seem to be much like those of *punctulata*, though it is perhaps less retiring. There is a large *Lycosa* (*L. blackwallii* Johnson) in Madeira, which may prey upon it but it seems to be absent from the lowlands about Funchal, where *P. vulgata* abounds.

NEW NAMES FOR WEST INDIAN TERTIARY PECTENS.

BY C. WYTHE COOKE.

Doctor T. Wayland Vaughan has kindly called my attention to the fact that the names *vaughani* and *waylandi* applied by me in 1919 to extinct species of *Pecten* from the West Indies had already been used by Ralph Arnold for different species of the same genus. For these preoccupied names I propose to substitute the following :

PECTEN VAUN Cooke, n. n.

Synonym : *Pecten vaughani* Cooke (not Arnold), Carnegie Inst. Washington, Pub. 291, p. 133, pl. 8, figs. 2–4, 1919.

Occurrence : Anguilla formation (upper Oligocene), Crocus Bay, Anguilla.

PECTEN VAUN var. FLABELLUM COOKE, n. n.

Synonym : *Pecten vaughani* var. *flabellum* Cooke, Carnegie Inst. Washington, Pub. 291, p. 134, pl. 8, figs. 6–7, 1919.

Occurrence : La Cruz marl (middle Miocene), La Cruz and Santiago, Cuba.

PECTEN (*Chlamys*) LANDI Cooke, n. n.

Synonym : *Pecten* (*Chlamys*) *waylandi* Cooke (not Arnold), Carnegie Inst. Washington, Pub. 291, p. 131, pl. 7, figs. 4a, b, 1919.

Occurrence: La Cruz marl (middle Miocene), Santiago, Cuba.

GEORGE BRETTINGHAM SOWERBY.

George Brettingham Sowerby, F. L. S. (the third G. B. S.), died on Jan. 31st at his residence at Richmond, Surrey, England. Eldest son of G. B. Sowerby (II), he was born in London, Sept., 1843. He commenced business as a conchologist about 1860. Many important collections passed through his hands during the 56 years he was in business, his retirement taking place in Jan., 1916. He was a fellow of the Linnean

Society, an original member of the Malacological Society of London and a member of the Conchological Society of Great Britain and Ireland.

He described in various publications about 720 new species of recent shells. Amongst his most important works we might mention: "Marine Shells of South Africa," 1897, with Appendix, 1897. "Illustrated Index of British Shells," 2nd Edition, 1887. "Thesaurus Conchyliorum," part of monograph of *Turbo* and whole of part 44, supplement to *Conus* and *Voluta.*

He leaves a widow, one son and two daughters. A most genial and generous character endeared him to all his friends and acquaintances.—H. C. F.

NOTES.

The Heavenly Twins.—Your correspondent in the Nautilus for October 20 (p. 70), Mr. Darling K. Greger, has started a nomenclatorial smoke screen which is provoking an unwonted excitation of my risibles. One must not deal cacophonously with so serious a matter as the substitution of new scientific names for old ones, especially when a felony is contemplated. So this case must go to the jury. It is stated in the note referred to and which I beg your permission to comment upon as I am the discordant cause behind it, that in 1913 I introduced the name *Brasilica* for a genus of Devonian brachiopods peculiar, as far as now known, to Brazil, but that in so doing I committed trespass as the term *Brasilica* (according to your correspondent) had been employed in 1898 by Dr. S. S. Buckman for a genus of Ammonites, in view of which interference an opening was presented for the creation of a new name into which Mr. Greger forthwith intrudes a proposed substitute, *Chapadella.* I was not aware of the magnitude of my offending until I received from Dr. Buckman a note on the subject which was intended for you, Mr. Editor, but which I have ventured to withhold as it innocently perpetuates an error. I am confident Dr. Buckman will pardon me for using his authority to explain that he never made use of the name *Brasilica.* Being a

good latinist he naturally would not. His genus-name was *Brazilia.* And so in his judgment and on the face of Mr. Greger's impeachment, *Brasilica* had a right to live. Alas! neither did I use the term *Brasilica,* but *Brasilia;* and here I am, *mutatis mutandis,* just as bad a trespasser on Dr. Buckman's preserve as if Mr. Greger's commentary had been right. Who is to decide in this very delicate point on nomenclatorial ethics, whether upon an indictment false and disproved, I can be convicted and fined. Perhaps it may be seemly for me to intimate that it is polite, when practicable, to permit an author to himself correct his errors when they are shown to him. If he will not, then he is beyond grace.

Doctor Dall, in his great wisdom, disposes of the matter thus: (Letter of February 21, 1921.)

"There is no *Brasilica* Clarke. Ergo, *Brasilica* Greger = 0. *Chapadella* Greger = *Brasilica* Greger = 0."

In the presence of this formula I propose to rechristen this brachiopod genus with the name *Brasilina.*—JOHN M. CLARKE.

LIGUUS AT MARCO, FLORIDA.—Marco, as you know, is a settlement at the north end of Key Marco, or Marco Island.

When we were collecting Liguus in 1904-6-7, we found none at Marco, and the inhabitants knew of none there then, though the tree snails were remembered as having been at Marco some years before. Also, a man told us he had in the past found "blue snails" near Marco and had been in the habit of shipping them to a curio dealer in Key West. He gave me the dealer's name and address.

We carefully examined the trees where the man reported the discovery of the blue Liguus but we found no snails of any kind there. Now (January, 1921) Albert Addison tells us that his son Chester, some weeks ago, saw snails having blue stripes on them in a thicket in sight of the houses of Marco, the same place I think where the man years before spoke of having found blue snails.

We searched carefully this thicket, which now is small, and found some Liguus there, which I am sending you by insured parcels post [*Liguus fasciatus roseatus*] but none of the blue variety, as you will see.

I am inclined to believe that the snails of Marco were nearly all killed by some unusually cold spells, but that a very few not found by us in our early visits here have been increasing in numbers in the trees of the thicket in question since then.—CLARENCE B. MOORE.

Capt. W. D. Collier, the leading citizen of Marco for a great number of years, informs me that there were no Liguus snails at Key Marco in his early days, but that forty-eight years ago he brought tree snails from Middle Cape (Cape Sable) and "planted" them at Caximbas, Goodland Point and Marco, all on Key Marco. He had been that winter with Prof. Velie of Chicago collecting Liguus on the lower coast and on the Keys along Hawk Channel to Key West. They searched all those Keys but he never saw or heard of Liguus showing any blue coloring. He states that Liguus, after the planting at Marco, developed and spread until they became numerous, but he thinks they subsequently were almost killed out by severe cold. M. G. MILLER.

NOTE ON A VARIETY OF LIGUUS.—In my paper on the variations and distribution of *Liguus* in Florida I figured a form from Lignumvitæ Key (pl. 37, figs. 4*c*, 4*d*) which I took to be a form of var. *lignumvitae*, having only three specimens. Mr. Simpson has recently named this form *Liguus solidus lineatus* (In Florida Wilds, Frontispiece, fig. 3). He states that among more than a thousand specimens examined he always found it distinct. It appears that the name *lineatus* is preoccupied by *Achatina lineata* Valenc., 1833, which was based upon another variety of the old *Liguus fasciatus*. To avoid having two varieties with the same name in the same species or closely related species, I would propose for the shell figured on my pl. 37, fig. 4*c* the varietal name LIGUUS FASCIATUS SIMPSONI, the type being no. 128063 A. N. S. P.—H. A. PILSBRY.

SHELLS OF ZION NATIONAL PARK, UTAH.—Fossil specimens of *Polita indentata* Say, *Gonyodiscus cronkhitei* Nc., and *Succinea avara* Say, imbedded in several pieces of limestone from Zion

Canyon, were presented to the Academy of Natural Sciences of Philadelphia by Louis H. Bregy. He also donated specimens of *Oreohelix haydeni* var. *oquirrhensis* Hemp. and *O. strigosa* var. *depressa* Ckll., which he collected at The Narrows, Zion Canyon, Zion National Park, S. W. Utah. This would indicate that *O. h. oquirrhensis* Hemp. probably inhabits the entire length of the state.—E. G. VANATTA.

SIPHONARIA JAPONICA Donovan AN EARLIER NAME FOR S. COCHLEARIFORMIS Reeve.—This common Japanese species was first described and very well figured in Donovan's Naturalist's Repository, III, 1825, pl. 79, as *Patella japonica.* It was collected by a Mr. Stutzer.

On pl. 78 of the same work *Venus stutzeri* Don. is figured, also from Japan. This is *Circe scripta* L. var. *personata* Desh., and earlier than Deshayes.—H. A. PILSBRY.

A NEW LOCALITY FOR ARKANSIA WHEELERI ORTMANN & WALKER. This new genus and species was described in NAUTILUS, 25, 1912, pp. 97–100, from Old River, at Arkadelphia, Clark Co., Arkansas. This is, as Wheeler has informed us (NAUTILUS, 31, 1918, p. 112) an "ox-bow" lake of the Ouachita River, a few miles above Arkadelphia, and this place, and the Ouachita River below Arkadelphia (Wheeler, l. c. p. 121), have remained, so far, the only localities from which this rare shell has been reported.

Recently a large number of Naiades from various parts of Oklahoma has been donated to the Carnegie Museum by D. K. Greger, of Fulton, Mo., collected by him in 1919. Among them was a single dead shell of *Arkansia wheeleri*, in fair condition, from Kiamichi River at Antlers, Pushmataha Co., Oklahoma, a tributary of Red River, in the southern portion of the state.

This considerably extends the range of this species, and we might expect to find it more widely distributed in the streams running southward from the Ozarks into the Ouachita and Red Rivers in southern Arkansas, northern Louisiana, and southern Oklahoma, and it might also exist in the Red River drainage in northeastern Texas.—A. E. ORTMANN.

PUBLICATIONS RECEIVED.

Lake Makinkuckee, A Physical and Biological Survey. By Barton Warren Evermann and Howard Walton Clark. 2 Vols. Publication No. 7, Department of Conservation, State of Indiana, Indianapolis, 1920. The mollusks are treated on pages 41 to 75 of Vol. 11 of this, the most exhaustive work on the ecology of any body of water in the United States. Very full and valuable notes are given on the food habits and general biology of the 14 species of Unionidæ which are recorded. The remainder of the list, furnished in part by Dr. Paul Bartsch, contains 79 species and subspecies of freshwater bivalves and univalves and 57 land snails. This brings the total number of species and subspecies of mollusks from this small Indiana lake and its environs to 130. Such a large number has probably not been previously recorded from a similar equal area in the same latitude.—G. Dallas Hanna.

The Journal of Conchology. Jan., 1921, Vol. 16, No. 4. On Obeliscus (Protobeliscus) riparius (Pfr.). By Geo. C. Spence, p. 135.

Obituary Notice: Edward Collier. By R. Standen, p. 136.

The Non-marine Mollusca of Llandudus and district. By H. Beeston, pp. 136–144.

Evolution in the Molluscan Radula. By The Rev. A. H. Cooke, pp. 145–150.

Note on Conus lineatus Solander and Conus lineatus Brug. By A. T. Hopwood, p. 151.

Scheme for the division of British marine area into census areas. By R. Winckworth, pp. 152–155.

Description of a new Galeomma from Bombay. By J. R. le B. Tomlin, p. 156.

Description of Antimitra (?) hewitti n. sp. from South Africa. By J. R. le B. Tomlin, p. 156.

Pisidium parvulum Clessin in the Great Ouse and the Severn. By C. Oldham, p. 158.

MORPHOLOGICAL FEATURES OF CERTAIN MUSSEL SHELLS FOUND IN LAKE ERIE COMPARED WITH THOSE OF THE CORRESPONDING SPECIES FOUND IN THE DRAINAGE OF THE UPPER OHIO. By Norman McDowell Grier. (Ann. Carnegie Museum, Vol. 13, pp. 145-182, 1920.)

MARINE MOLLUSKS OF HAWAII. By Henry A. Pilsbry. (Proc. Acad. Nat. Sci., Phila., 1920, pp. 296–328, pl. 12, with 11 figs. in text.) Forty-five new species and subspecies are described, with keys to the described species of Hawaiian Terebra and Mitra.—C. W. J.

THE WEST AMERICAN MOLLUSKS OF THE FAMILIES RISSOELLIDAE AND SYNCERATIDAE AND THE RISSOID GENUS BARLEEIA. By Paul Bartsch. (Proc. U. S. Nat. Mus., 1920, Vol. 38, pp. 159–176, pls. 12, 13.)

NEW FRESH-WATER SHELLS FROM GUATEMALA. By William B. Marshall. (Proc. U. S. Nat. Mus., 1920, Vol. 58, pp. 301–302, pl. 17.)

THREE NEW SPECIES OF PLEUROCERIDAE. By Calvin Goodrich. (Occas. papers Mus. Zool., Univ. Mich., No. 91, pp. 1–5, pl. 1, 1921.)

NEW FLORIDIAN SUBSPECIES OF THE GENUS LIGUUS. By Charles T. Simpson. (Proc. Biol. Soc., Washington, 1920, Vol. 33, pp. 121–126.) Eighteen new subspecies are described.

SUMMARY OF THE MARINE, SHELL-BEARING MOLLUSKS OF THE NORTHWEST COAST OF AMERICA, from San Diego, California, to the Polar Sea, mostly contained in the collection of the United States National Museum, with illustrations of hitherto unfigured species. By William Healey Dall, U. S. Nat. Mus. Bull. 112, 1921, 217 pages, 22 plates. "To the preparation of this summary the author has brought the results of more than 50 years' study of the molluscan fauna of the northwest coast." Its appearance has long been looked forward to by West Coast con-

chologists, and indeed by all who are interested in American marine shells. There are no descriptions, but a reference is given to description and figure, if published. A large proportion of the descriptions have appeared in the widely-distributed Proceedings of the National Museum, and so are generally accessible to those concerned.

A great number of moderately large and striking shells are recorded from Bering Sea. The array of *Chrysodominæ* and *Buccinidae* is astonishing, and so far as I know unparalleled anywhere else in the world.

The Californian fauna comprises 996 of the 2122 species enumerated. 151 species are exclusively abyssal, and 136 species are common to the Atlantic, nearly all belonging to the Arctic seas.

In the list Dr. Dall has frequently used subgeneric names in place of generic. It appears to the writer that since a binomial name is defined as consisting of the generic combined with the specific name, it would be better to conform to the ordinary usage. The distinction between genus and subgenus is of course largely a matter of individual opinion or of current use, but one cannot logically consider a given group to belong to both taxonomic grades. In more important matters there appears little to criticize and much to commend and admire.

When Dr. Dall took up the study of West Coast mollusks some 468 species had been recorded. The enormous advance he has made in all branches of the science, with the help of many zealous workers on the coast, is shown by this volume. It is a splendid record of the achievements of a generation of conchologists, and an inspiration for those to come.—H. A. P.

The Cretaceous Formations of Northeastern Colorado, and the Foothills Formations of Central Colorado. Colo. Geol. Surv. Bull. 19. By Junius Henderson. While concerned mainly with Mesozoic geology and paleontology, there are some references to recent mollusks, as on p. 45 where the shells of Greasewood Lake, near Osgood, and of some similar ephemeral lakes are discussed.—H. A. P.